PART 3 — AERODROMES (AD)

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AD 1. AERODROME/HELIPORT — INTRODUCTION

AD 1.1 AERODROME/HELIPORT AVAILABILITY

1. General conditions under which aerodrome/heliport and associated facilities are available for use

1.1 Subject to the observance of the applicable rules, conditions, and limitations set forth in this document, foreign civil aircraft registered in a foreign country which at the time is a member of the International Civil Aviation Organisation, may be navigated in Macao.

1.2 Aircraft registered under the laws of foreign countries, not members of the International Civil Aviation Organisation, which grant reciprocal treatment to Macao aircraft and airmen may be navigated in Macao subject to the observance of the same rules, conditions, and limitations applicable in the case of aircraft of ICAO member states.

1.3 However, excluding when existing bilateral agreements for regular scheduled flights, a prior authorisation has to be forwarded to and granted by the Civil Aviation Authority in conditions laid in GEN 1.2 - 1 to 1.2 - 8 of this AIP.

1.4 Access of persons to restricted and controlled areas

1.4.1 As a general principle, access to restricted areas is only permitted in respect of persons who carry out regular duties in such areas and while performing such duties.

1.4.2 Special cases concerning persons whose duties include actually performing activities in restricted areas to an extent as justifies being granted access to such areas, may be considered, but are not included in the item above.

1.4.3 The principles governing the access of members of Diplomatic Legations as set forth in the Vienna Convention are upheld, and shall be addressed in the appropriate Resolution.

1.4.4 Access to restricted and controlled areas shall be granted by means of permanent or temporary access card, according to circumstances.

1.4.5 In order to provide efficient and stringent control of access of persons to restricted areas and controlled areas, the following access cards shall be issued:

a) Permanent access card (2 years)

b) Temporary access card (up to 5 consecutive days and according to the period authorized)

1.4.6 Details of access of persons to restricted and reserved areas refers to FAL/SEC Resolution No. 1/2010.

1.5 Access and circulation of vehicles in restricted areas

1.5.1 The access and circulation of vehicles in restricted areas is authorised as follow: on a permanent basis in respect of vehicles employed regularly in such areas, or on a temporary or single basis in respect of vehicles occasionally employed in such areas.

1.5.2 The authorisation applies only to the vehicle itself. The occupants or load carried in the vehicles, as well as the driver are excluded from such authorisation and shall comply will access rules and other pertaining requirements.

1.5.3 The authorisation applies to restricted areas shall further be subject to Safe Circulation Rules (Safety), that shall include, among others, flame damper for exhaust pipes, driver's license, appropriate insurance, etc.

1.5.4 The control of access and the surveillance of the circulation of vehicles in restricted areas is done by means of system of identification for vehicles, comprising three modes:

a) Fixed identification

b) Removable plates

c) Badges

1.5.5 Details of access and circulation of vehicles in restricted areas refers to FAL/SEC Resolution No. 2/95.

2. Applicable ICAO documents

ICAO Standards and Recommended Practices contained in Annex 14 are applied in so far as geographical limitations permit. Differences to ANNEX 9 are mentioned in Section GEN 1.7.

3. Civil use of military air base

NIL.

4. CAT II operations at aerodrome

RWY 34, subject to serviceability of the required facilities, is suitable for CAT II operations by operators whose minima have been accepted by the Civil Aviation Authority. LOW

VISIBILITY OPERATIONS PROCEDURES (LVP) will be in force whenever:

i) Runway Visual Range (RVR) - TDZ RWY 34 - is 800 m or below; or,

ii) Cloud base height (CBH) - RWY 34 - is 200 ft or below; or,

iii) Visibility conditions decrease rapidly;

Pilots will be informed when this procedure is in use by RTF and ATIS through the message "LOW VISIBILITY OPERATIONS IN FORCE".

CAT II operations at MIA by operators of aeroplanes not registered in Macao will be considered under proposal to Civil Aviation Authority indicating the aeroplane type, certification by the State of Registry to operate CAT II and minimum authorised by the State and the operators.

All Weather Operation Manual will be available upon request.

5. Friction Measuring device used and friction level below which the runway is declared slippery when it is wet

5.1 Runway surface friction at Macao is measured by means of a Mu-meter. Runs are carried out at a speed of 65 km/hour regularly on a dry runway surface using a self-watering device giving a controlled depth of 1 mm of water to monitor the effectiveness of the rubber deposit removal action and surface wear and tear. Should the friction value fall to 0.42 or less the runway will be notified as liable to be slippery when wet and the Macau International Airport Co. Ltd. (CAM), Airport Operations Department should initiate the corrective actions.

5.2 If and when such notification is given, there may be a significant deterioration both in aircraft stopping performance and directional control when the runway is wet. Takeoff or landing should then be considered only if the distances available equal to or exceed those required for slippery conditions as determined in the Aeroplane Flight Manual.

5.3 If a pilot experiences a significant degradation of the braking action, it should immediately be reported to ATC for relay to subsequent landing aircraft and for follow-up action by CAM, Airport Operations Department.

6. Other Information

NIL.

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AD 1.2 RESCUE AND FIRE FIGHTING SERVICES AND SNOW PLAN

1. Rescue and fire fighting services

Adequate rescue and fire fighting vehicles are provided at Macau International Airport. The degree of protection has been determined in accordance with attachment A to Annex 14. In addition, 2 fire fighting vessels with foam and water fire-fighting capability together with 2 rescue vessels will be available 24 hours a day. AD 2.6 refers.

2. Snow Plan

NIL.

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AD 1.3 INDEX TO AERODROMES AND HELIPORTS

Aerodrome/heliport Location indicator	Type of traffic permitted to use the aerodrome/heliport: International-National (INTL-NTL)	IFR - VFR	S = Scheduled NS = Non-scheduled P = Private	Reference to AD section and remarks
1	2	3	4	5
Aerodromes				
MACAU/International VMMC	INTL	IFR - VFR	S - NS - P	AD 2 - VMMC
Heliports				
MACAU/Heliport	INTL	VFR	NS - P	AD 3

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AD 1.4 GROUPING OF AERODROMES/HELIPORTS

NIL.

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AD 2. AERODROME

VMMC AD 2.1 AERODROME LOCATION INDICATOR AND NAME

VMMC - Macau International Airport

VMMC AD 2.2 AERODROME GEOGRAPHICAL AND ADMINISTRATIVE DATA

1	ARP coordinates and site at AD	22° 08’ 58” N 113° 35’ 29” E Middle of Runway
2	Direction and distance from city	330° true bearing / 5.4 km to Macao Ferry Terminal
3	Elevation/Reference temperature	6.2 m (20 ft) AMSL / 31.5° C
4	MAG VAR	3°W (2016)
5	AD Administration, address, telephone, telefax, telex, AFS	Airport Director of the Macau International Airport CAM - Macau International Airport Co. Ltd, Airport Operations Department Macau International Airport Taipa MACAU Tel : (853) 2886 1111 Telefax: (853) 2886 2222 AFS : VMMCYDYA
6	Types of traffic permitted (IFR / VFR)	IFR / VFR
7	Remarks	NIL.

VMMC AD 2.3 OPERATIONAL HOURS

1	AD Administration	H24
2	Customs and immigration	H24
3	Health and sanitation	H24
4	AIS Flight Briefing Unit	H24
5	ATS Reporting Office	H24
6	MET Briefing Office	H24
7	ATS	H24
8	Fuelling	H24
9	Handling	H24
10	Security	H24
11	De-icing	NIL.
12	Remarks	NIL.

VMMC AD 2.4 HANDLING SERVICES AND FACILITIES

1	Cargo handling facilities	All modern facilities handling weights up to 15 000 kg.
2	Fuel / oil types	Fuel types: AVTUR JET A1 Oil types: As requested by operators maintenance manuals and as engine specifications.
3	Fuelling facilities / capacity	All A “even” parking stands and all B parking stands are hydrant served for AVTUR JET A1
4	De-icing facilities	NIL.
5	Maintenance Hangar space	Limited & unheated, up to B747-400.
6	Repair facilities for visiting aircraft	Line maintenance.
7	Remarks	NIL.

VMMC AD 2.5 PASSENGER FACILITIES

1	Hotels	Unlimited in city hotels.
2	Restaurants	In the city and at airport.
3	Transportation	Taxis and buses.
4	Medical facilities	First aid treatment and hospitals in city.
5	Bank and Post Office	Bank is not available. Only ATM machines and Money exchange counters. Post Office is at AD.
6	Tourist Office	At AD.
7	Remarks	NIL.

VMMC AD 2.6 RESCUE AND FIRE FIGHTING SERVICES

1	AD category for fire fighting	Category IX
2	Rescue equipment	Yes Additional: • 2 rescue vessels • 2 fire fighting (foam with water) vessels • 1 SAR vessel (max rescue capacity: 85 persons, and 20 life rafts-20 person each raft)
3	Capability for removal of disabled aircraft	Lifting capability: up to 224 tons
4	Remarks	Fire fighting media and operational reserves in accordance with the equipment laid down in ICAO ANNEX 14.

VMMC AD 2.7 SEASONAL AVAILABILITY - CLEARING

1	Types of clearing equipment	NIL.
2	Clearance priorities	NIL.
3	Remarks	NIL.

VMMC AD 2.8 APRONS, TAXIWAYS AND CHECK LOCATION DATA

1	Apron surface and strength	surface: concrete strength: PCN 65/R/B/W/T
2	Taxiway width, surface and Strength	Taxiway C2 — width: 23 m surface: concrete strength: PCN 66/R/B/W/T Connection ways G — width: 39 m surface: concrete strength: PCN 66/R/B/W/T D, E, F — width: 25 m surface: concrete strength: PCN 66/R/B/W/T Taxiway Bridge H — width: 23-39 m surface: concrete strength: B747-400 * Taxiway Bridge C1 — width: 23 m surface: concrete strength: B747-400 * *PCN not established because they are bridges, actual calculated resistance up to 3970 KN equivalent to a loaded B747-400.
3	ACL location and elevation	Location: holding points of RWY 16 and 34 (see AD Chart) Elevation: 6.2 m (20 ft) AMSL.
4	VOR/INS checkpoints	VOR: see AD Chart INS: see AD Chart
5	Remarks	Load limit for a B747-400 taking off is 395 900 kg.

VMMC AD 2.9 SURFACE MOVEMENT GUIDANCE AND CONTROL SYSTEM AND MARKINGS

1	Use of aircraft stand ID signs, TWY guide lines and visual docking / parking guidance system of aircraft stands	Nose-wheel guide line when taxiing on apron and taxiway and enter/exiting the runway. Advanced-Visual Docking Guidance System (AVDGS) is in use for apron parking for stand A04, A02, B02 and B04, and marshalling is provided for the rest of aircraft parking stands.
2	RWY and TWY markings and LGT	RWY: Runway designation, threshold, touchdown zone, centre line, fixed distance marker and side line, marked and lighted TWY: Taxi-holding positions, taxiway intersections, taxiway edge line, ACFT stand line, marked and lighted.
3	Stop bars	Stop bars where appropriate (see chart AD 2 - VMMC – 52)
4	Remarks	NIL.

VMMC AD 2.10 AERODROME OBSTACLES

In approach/TKOF areas			In circling and at AD		Remarks
1			2		3
RWY/Area affected	Obstacles type Elevation Marking/LGT	Coordinates	Obstacle type Elevation Marking/LGT	Coordinates	
a	b	c	a	b	
16 / APCH 34 / TKOF	Entrance fairway for Porto Interior & Porto Exterior	NIL.			NIL.
16 / TKOF 34 / APCH	Entrance fairway for Porto de KA HO	NIL.			

VMMC AD 2.11 METEOROLOGICAL INFORMATION PROVIDED

1	Associated MET Office	Macau
2	Hours of service MET office outside hours	H24
3	Office responsible for TAF preparation Periods of validity	Macau MET Office 30 HR
4	Type of landing forecasts Interval of issuance	TREND At least every 30 minutes
5	Briefing/consultation provided	Personal consultation
6	Flight documentation Language used	Charts, METARs, TAFs, SIGMETs, VA and TC advisory information English
7	Charts and other information available for briefing or consultation	Prognostic upper air chart, Significant weather chart, Weather Satellite & Radar, Lighting Detector
8	Supplementary equipment available for providing information	Aviation Weather Information System (AWIS)
9	ATS units provided with information	Macau TWR
10	Additional information (limitations of service etc.)	NIL.

VMMC AD 2.12 RUNWAY PHYSICAL CHARACTERISTICS

Designations RWY NR	True & MAG BRG	Dimensions of RWY (m)	Strength (PCN) and surface of RWY and SWY	THR coordinates	THR elevation and highest elevation of TDZ of precision APP RWY
1	2	3	4	5	6
16	161° GEO 164° MAG	3360 x 45	PCN 66/R/B/W/T	22° 09’ 38.31” N 113° 35’ 14.14” E	20 ft
34	341° GEO 344° MAG	3360 x 45	PCN 66/R/B/W/T	22° 08’ 17.46” N 113° 35’ 43.91” E	20 ft

Slope of RWY-SWY	SWY dimensions (m)	CWY dimensions (m)	Strip dimensions (m)	OFZ	Remarks
7	8	9	10	11	12
0°	60 x 45	60 x 45	3510 x 300	YES	NIL.
0°	60 x 45	60 x 45	3510 x 300	YES	NIL.

VMMC AD 2.13 DECLARED DISTANCES

RWY Designator	TORA (m)	ASDA (m)	TODA (m)	LDA (m)	Remarks
1	2	3	4	5	6
16	3225	3285	3285	2865	Displaced THR : 360 m
34	3300	3360	3360	2930	Displaced THR : 370 m

VMMC AD 2.14 APPROACH AND RUNWAY LIGHTING

RWY Designator	APCH LGT type LEN INTST	THR LGT colour WBAR	VASIS (MEHT) PAPI	TDZ LGT LEN	RWY Centre Line, LGT Length, spacing colour, INTST	RWY edge LGT, LEN spacing colour, INTST	RWY End LEN, spacing colour WBAR	SWY LGT LEN colour	Remarks
1	2	3	4	5	6	7	8	9	10
16	SIAL 600 m LIH	GREEN -	PAPI Both / 3° (70.87 ft/ 21.60 m)	NIL	2865 m, 30 m*, LIH	3460 m, 60 m White - 2280 m Yellow - 600 m LIH	Red -	60 m Red	* ICAO standard colour coding
34	CAT 1-2-3 420 m LIH	GREEN -	PAPI Right / 3° (65 ft/ 19.81 m)	900 m	2930 m, 30 m*, LIH	3460 m, 60 m White - 2340 m Yellow - 600 m LIH	Red -	60 m Red	

VMMC AD 2.15 OTHER LIGHTING, SECONDARY POWER SUPPLY

1	ABN/IBN location, characteristics and hours of operation	NIL.
2	LDI location and LGT Anemometer location and LGT	LDI: NIL. Surface wind: One at touchdown zone of RWY 16 One at touchdown zone of RWY 34 One at middle All are 130 m East of RWY centre line Cloud base: Two (105 m East of RWY centre line), one at each RWY end
3	TWY edge and centre line lighting	Edge : TWY D, E, F, C3 Section of TWY H, G, & C1 – red obstacle lights at taxiway edge Centre line : All TWY
4	Secondary power supply / switch-over time	one generator on each sub-station (3 in total) up to 500 KVA. CAT II ILS operations relying on main generator, and with back-up on commercial power. Switch-over time: 0.5 sec
5	Remarks	NIL.

VMMC AD 2.16 HELICOPTER LANDING AREA

NIL.

VMMC AD 2.17 ATS AIRSPACE

1	Designation and lateral limits	Macau Aerodrome Traffic Zone (ATZ). The Macau ATZ is a regulated airspace, extending in a circle of 5 NM radius from the aerodrome reference point except to the west where the boundary is a straight line parallel to the runway at a distance of 3 NM. There is a 5NM wide stub, out to 10NM on the approach to runway 34 and a 2 NM wide stub out to 6.27 NM (Jiuzhou DVOR) on the 215° (true bearing) inbound track to the runway 16 LLZ.
2	Vertical limits	SFC to 3000 ft (900 m) AMSL
3	Airspace classification	C
4	ATS unit call sign Language(s)	Macau Tower English
5	Transition altitude	Refer to ENR 1.7
6	Remarks	NIL.

VMMC AD 2.18 ATS COMMUNICATION FACILITIES

Service designation	Call sign	Frequency	Hours of operation	Remarks
1	2	3	4	5
TWR	MACAU TWR	118.000 MHz 119.400 MHz	H24	Primary control channel Secondary control channel
Ground control	MACAU Ground	121.725 MHz 121.975 MHz	H24	Primary control channel Secondary control channel
Emergency	Emergency	121.500 MHz	H24	Emergency
ATIS	MACAU ATIS	126.400 MHz	H24	Broadcast only
*Liaison of fire fighting service to aircraft crew		*123.100 MHz	H24	Auxiliary frequency SAR *to be used on ground, for actual fire crash fighting only
Search and Rescue (Main)		125.150 MHz	H24	For communication with SAR vessels and SAR aircraft
Search and Rescue (Back up)		120.800 MHz	H24	Back up of 125.150 MHz
		122.350 MHz	H24	Reserved

VMMC AD 2.19 RADIO NAVIGATION AND LANDING AIDS

Type of aids, CAT of ILS / MLS(For VOR / ILS / MLS, give VAR)	ID	Frequency	Hours of operation	Site of transmitting antenna coordinates	Elevation of DME transmitting antenna	Remarks
1	2	3	4	5	6	7
LLZ 34 ILS CAT II (3° W / 2016)	MCN	109.700 MHz	H24	22°09’54”N 113°35’09’E	3.8 m / 12.5 ft	ICAO Facilities Performance CAT II
DME		CH. 34X	H24	22°08’28”N 113°35’44”E		
GP 34		333.200 MHz	H24	22°08’28”N 113°35’44”E		
LLZ 16	MCS	111.700 MHz	H24	22°09’40”N 113°32’54”E	87 m / 285.5 ft	
DME		CH. 54X				
DVOR	MCU	116.400 MHz	H24	22°08’08”N 113°35’52”E	9.1 m / 30 ft	unusable within sector 230° to 260° clockwise at and below 2700 ft
DME		CH. 111X				
DVOR	ZAO	117.200 MHz	H24	22°14’47”N 113°36’47”E	47.3 m	
DME		CH. 119X				
Secondary radar		1030 MHz / 1090 MHz	H24	22°07’14”N 113°33’43”E		Monitoring purpose only

VMMC AD 2.20 LOCAL TRAFFIC REGULATIONS

1 Aircraft flying to and from the airport are not allowed to overfly urban, populated areas on the North and West shore of Macau International Airport, comprising Macau Peninsula, and Taipa and Coloane Islands

2 Turbulence may be encountered.

3 Pilots are warned that VFR holding by fixed-wing and rotary-wing light aircraft, one at a time, may take place from time to time during daylight and night hours east of the runway.

4 Overflight of urban area.

All aircraft are forbidden to fly over the urban area in Macao Special Administrative Region.

5 Transit and departure conditions for engine - out ferry flights

5.1 General conditions

5.1.1 Transit engine-out ferry operations through Macao will not be permitted.

5.1.2 Departure engine-out ferry operations will only be permitted if so approved in the airplane Flight Manual.

5.1.3 No form of revenue load is to be carried.

5.1.4 Aerodrome operating minima are to be not less than 1000 ft cloud ceiling and 5 km (2.7 NM) visibility.

5.1.5 In the ATC flight plan, an engine-out ferry flight is to be notified and confirmation that the conditions for engine-out ferry flight will completed with must be included in item 18 by the insertion of a statement:

5.2 Conditions for departing flights

5.2.1 Engine-out ferry flights departing from Macao must obtain prior permission from the Civil Aviation Authority.

5.2.2 Engine-out ferry take-off must be operated on Runway 16.

5.2.3 The aircraft must be operated at a weight which, in the event of future engine failure at or after V1, will enable a positive net flight path to be maintained and standard ICAO obstacle clearance requirements to be met.

6. Ground manoeuvring of aircraft at Macau International Airport

6.1 Legislation

6.1.1 The rules concerning ground manoeuvring of aircraft and vehicles are indirectly specified in Eleventh Schedule to the Air Navigation Regulation of Macao.

6.2 Definition of taxiing aircraft

6.2.1 Aircraft taxiing are those aircraft manoeuvring under the following conditions:

(1) Aircraft moving under their own power within the airport boundaries or any part of the airport subject to communal use, excluding take-off and landing.

(2) Aircraft being moved with the assistance of auxiliary power i.e. tractor, jeep or by any other mechanical means.

(3) Aircraft being manoeuvred by hand.

Note: Aircraft classified under 1), 2) and 3) above are not subject to these regulations unless they are moved along or across runway or taxiways, in which case they are considered to be taxiing.

6.3 Local taxiing / air-taxiing regulations

6.3.1 Overtaking of moving aircraft at Macau International Airport when taxiing is prohibited.

6.3.2 When taxiing/air-taxiing on the Terminal apron aircraft shall follow the nose-wheel guide lines at all times. Marshalling service will normally be available to assist pilots in the correct positioning of their aircraft whilst parking.

Note: Pilots should exercise extreme caution when manoeuvring on the aprons due to the proximity of other aircraft, ground staff and equipment. Engine power should be restricted to the minimum required to reduce the adverse effect of jet blast. A case in point is the use of greater than normal breakaway thrust when making the turn from the parking bay to the taxiway centreline. Pilots should restrict the power setting to the absolute minimum necessary to execute the turn.

6.4 Aircraft equipped with radio

6.4.1 Before the commencement of any manoeuvre, all aircraft equipped with radio, except those specified in the “Note” to paragraph 6.2 above are to call “Ground“ on 121.725 MHz or Macau Tower on 118.0 MHz when Ground control is not in operation.

6.4.2 A person qualified, as in paragraph 6.6 below, shall be in charge of all movements. If voice communication cannot be established, the aircraft is to remain in position and comply with regulations applicable to aircraft not fitted with radio.

6.5 Aircraft unable to establish radio contact

6.5.1 When aircraft that are unable to establish radio contact are to be moved, details of all such manoeuvres are to be passed by telephone or personal contact the Airport Operation Centre.

6.6 Persons qualified to taxi / air-taxi aircraft

6.6.1 No person may taxi/air-taxi an aircraft on Macau International Airport unless he is qualified under one of the following categories:

6.6.1.1 A licensed pilot in possession of a valid license to operate that type of aircraft ;

6.6.1.2 A Student Pilot under instruction who has been authorised by a Flying Instructor in possession of a valid instructor’s license for that type of aircraft.

6.7 Towing aircraft

All towing manoeuvring not intended for departure shall be previously coordinated with airport operations service.

7 Regulations for local flights in the Macau Aerodrome Traffic Zone (ATZ)

7.1 ATC Unit

Flights within the ATZ are under the control of Aerodrome Control, call sign “Macau Tower”, operating on 118.0 MHz for air movements and “Macau Ground” operating on 121.725 MHz for ground movements.

7.2 General rules

7.2.1 ATC clearance for local flying will only be given if, in the assessment of the Aerodrome Control, such flying will not interrupt or unnecessarily delay the normal operation of public transport aircraft.

7.2.2 Solo flights by non-licensed pilots are prohibited.

7.2.3 Before entering the ATZ, pilots shall request ATC clearance.

7.2.4 Before leaving the ATZ, pilots shall inform ATC of their exit point and destination before changing to the next ATC unit.

7.2.5 VFR flights during daylight hours may be cleared by ATC provided the weather observation at Macau International Airport shows a visibility of at least 5 km and a cloud ceiling of not less than 1500 ft.

7.3 Fixed-wing aircraft operations

7.3.1 Take-off and Landing restrictions

See charts

7.3.2 Traffic Circuit

See charts

7.3.3 Weather Minima

7.3.3.1 Circuit operations are not permitted when the visibility is less than 5 km or the lowest cloud is lower than 1500 ft in the circuit area.

7.3.3.2 Low visibility operation minimum: see AD chart.

7.3.4 Night flying

7.3.4.1 Special VFR flights at night may be cleared by Macau Tower providing that:

(1) Traffic density is such that flights will not delay public transport aircraft.

(2) Weather observations show a visibility of at least 9 km and a cloud ceiling of not less than 1800 ft.

(3) The scale of equipment carried by the aircraft is adequate for flying at night.

(4) The flight is contained in Macau ATZ, or

(5) The flight has been initiated and authorised by adjacent ATS Unit, or has been accepted by an adjacent ATZ unit.

8 Push - back and start - up procedures

8.1 All aircraft other than helicopters are to call one of the following services five minutes prior to start-up to put their clearance on request:

8.1.1 Macau Ground 121.725 MHz permanent

8.1.2 Macau Tower 118.000 MHz permanent

8.2 Pilots are to inform Macau Ground/Tower as appropriate their callsign, parking bay number/location and proposed flight level if it is different from the filed flight plan when they make the call as per para. 8.1 above.

8.3 Aircraft should not commence start-up, push back or any other manoeuvre on the apron unless they have obtained clearance from Macau Ground/Tower as appropriate.

8.4 Aircraft start-up engines will be allowed by Macau Control Tower, after the engines clear the white taxi line protection.

8.5 Whilst push back procedure is being conducted it is essential for safety reasons that communications contact is maintained between pilot and ground engineer in charge.

8.6 Once a request for clearance has been made as per para. 8.1 above, delays in getting ready to start, taxi or take-off may result in withdrawal of ATC clearance.

8.7 Color-Coded Aircraft Pushback Procedures

STAND NUMBER	RWY 34/16 Departure	
	Normal pushback & start-up	Pushback after engine started-up
A1-A15,A17, B1-B6, B8	BLUE	BLUE
B7, B10	GREEN	GREEN/PINK
G01-G15	FOLLOW BREAKAWAY POINT “X”, “Y” OR “Z”	N/A

Color-coded Push back Procedures

Color Code	*Detailed Description*
BLUE	Aircraft pushback facing South or North depending on the Runway-in-use. If necessary, special instruction will be issued by Control Tower. Startup can be commenced after the engines cross the white taxi line protection.
GREEN	Pushback of aircraft on B7 or B10 in normal situation shall be done by pushing the aircraft tail towards GAP, and then towed forward until Breakaway Point 1 for aircraft with wingspan less than 36m (narrow body) and Breakaway Point 2 for aircraft with wingspan more than 36m (wide body). Breakaway Point 2 also applies for situation that aircraft on B7 or B10 with APU problem, and requires starting up engine on stand while No aircraft is parked on G05 to G08. **Except that the startup on stand due to APU problem, other startup can only be commenced when the pushback finishes at Breakaway Point.**
PINK	The pink procedure requires pushing the aircraft tail towards North until either the beginning of Taxiway C1 for RWY16 departure or taxiway A for RWY34 departure. Except that the startup on stand due to APU problem, other startup can only be commenced when the pushback finishes. The procedure applies for Pushback of aircraft with APU problem, which requires to start up engine on stand B7 or B10 while aircraft is parked on G05 to G08.

Remarks:

1. For aircraft parked on Stands B1 and B3, no simultaneous pushback is allowed.
2. For aircraft start up on the Stand, coordination shall be done in advance among ATC, Pilot and AOCC (for follow-me to inspect the surrounding area of the aircraft involved) in order to guarantee ground safety.
3. The breakaway point 1 mentioned above is the one at B7 and breakaway point 2 is one between B5 and B7.
4. For blue procedure, the color code may be omitted in the air-ground communication between ATC and pilot.

G01 – G15 Push Back /Tow Procedures

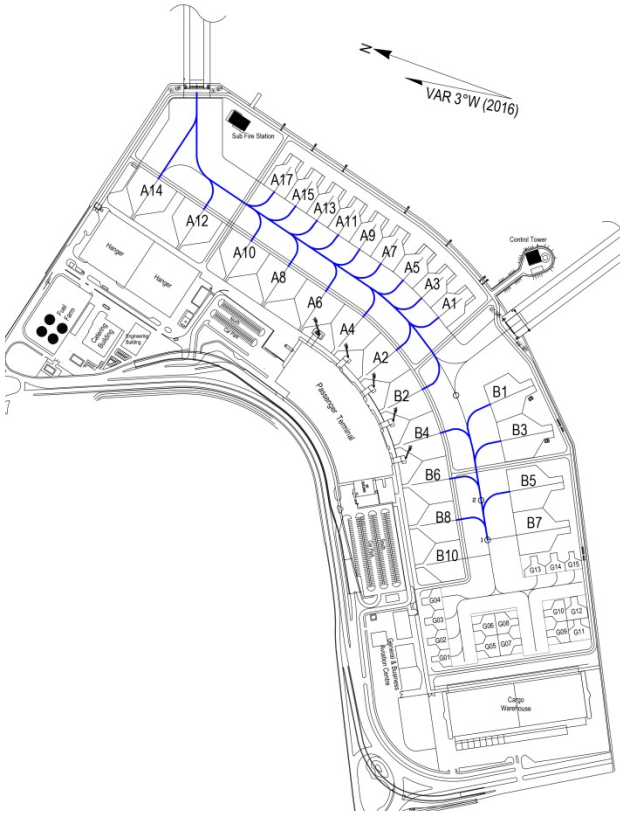
Aircraft Stand	*Nose wheel on Breakaway Point*	*Detailed Description*
G01, G02, G03, G04	X	Aircraft shall be pushed back following the BLUE lead out line until the aircraft tail towards Cargo Roadway, and then pull ahead up to Breakaway Point "X".
G05, G06		Aircraft shall be towed out following the BLUE lead out line until the aircraft tail towards Cargo Roadway, and then pull ahead up to the Breakaway Point "X".
G07, G08, G09, G10	Y	Aircraft shall be towed out following the BLUE lead out line and until the aircraft tail towards Cargo Roadway, and then pull ahead up to the Breakaway Point "Y".
G11, G12	Z	Aircraft shall be towed out following the BLUE lead out line and taxilane centre line up to the Breakaway Point "Z".
G13, G14, G15		Aircraft shall be pushed back following the BLUE lead out line until the aircraft tail towards East Roadway, and then pull ahead up to the Breakaway Point "Z".

Remarks:

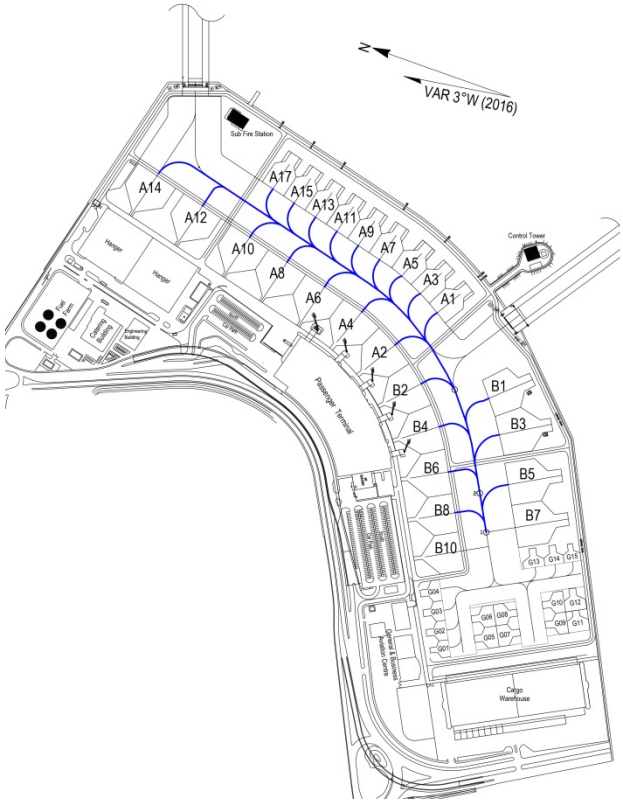
1) All GA/helicopter arrivals will be guided by Follow-me to the designated aircraft stands.
2) The Breakaway Points "X", "Y" and "Z" are located on the taxilane centre line behind G03, ahead of G10, and behind G13 respectively.
3) Helicopter operations are exempted from following the defined Breakaway Points but are required to be pushed /towed to the taxilane abeam its parking stand for startup and taxi out.
4) Two wing walkers are mandatory to be present for all pushback/tow manoeuvres.
5) NO simultaneous pushback / tow operations on Breakaway Points "Y" and "Z" is allowed.
6) NO engine start up on stand before pushback / tow is allowed. Exception can be considered for aircraft parked on G06, G08, G10 or G13 with coordination made in advance among AOCC, Ground Handling Agent (GHA), Pilot and ATC. Follow-me shall inspect the surrounding area of the aircraft involved and ensure the following conditions are met prior to aircraft start up and taxi out at its own power.

Aircraft Stand	**Direct-taxi-out Conditions**
G06	G05 & G08 are clear
G08	G06 & G07 are clear
G10	G09 & G12 are clear
G13	B07 & adjacent Equipment Parking Areas are clear

AIRCRAFT PUSHBACK BLUE PROCEDURE (RWY 34)



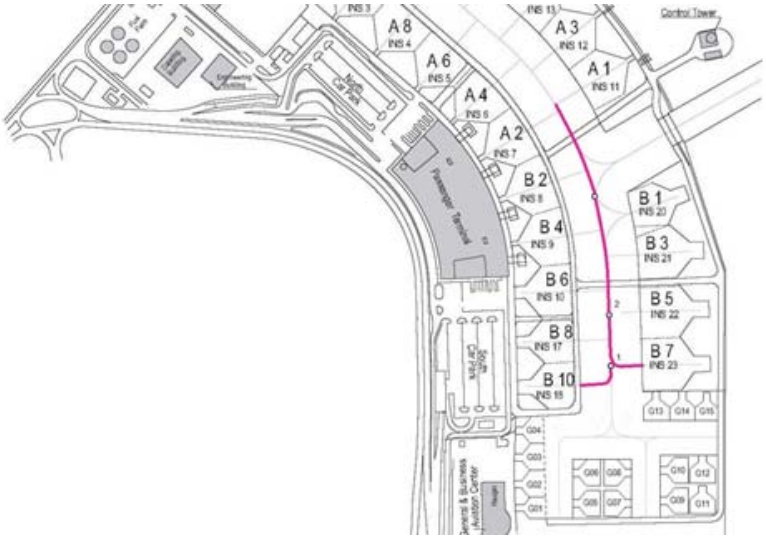
AIRCRAFT PUSHBACK BLUE PROCEDURE (RWY 16)



AIRCRAFT PUSHBACK GREEN PROCEDURE FOR B7 AND B10 NORMAL (WINGSPAN < 36M)

AIRCRAFT PUSHBACK GREEN PROCEDURE FOR B7 AND B10 NORMAL (WINGSPAN > 36M) OR STARTED-UP WITHOUT AIRCRAFT ON G05 to G08

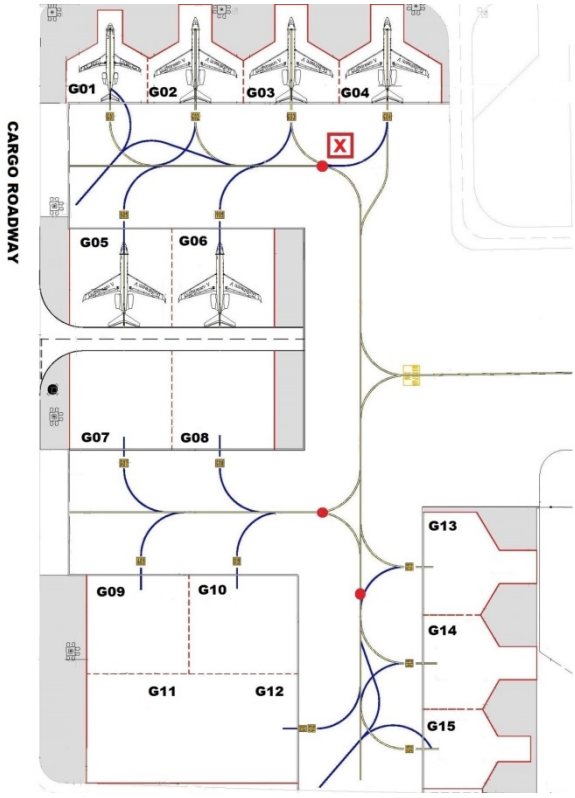
AIRCRAFT PUSHBACK PINK PROCEDURE FOR B7 AND B10 (RWY 34)



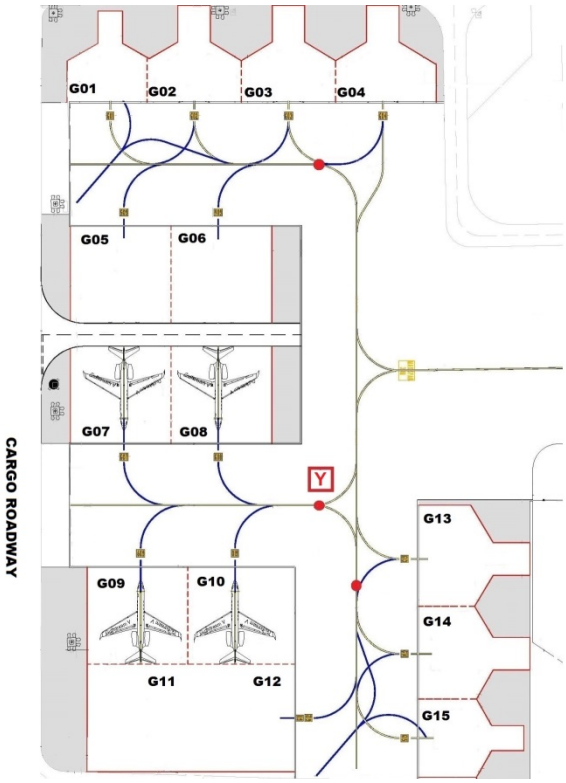
AIRCRAFT PUSHBACK PINK PROCEDURE FOR B7 AND B10 (RWY 16)

AIRCRAFT PUSHBACK / TOW PROCEDURE FOR BREAKAWAY POINT "X" (RWY 34 / 16)

Stands G01 – G06

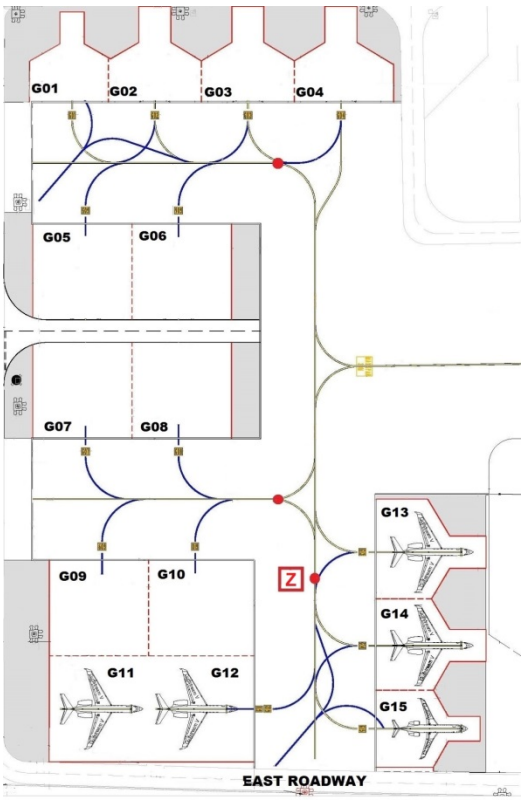


AIRCRAFT PUSHBACK / TOW PROCEDURE FOR BREAKAWAY POINT "Y" (RWY 34 / 16)
Stands G07 – G10



AIRCRAFT PUSHBACK / TOW PROCEDURE FOR BREAKAWAY POINT "Z" (RWY 34 / 16)

Stands G11 – G15



9 Advanced-Visual Docking Guidance System (AVDGS)

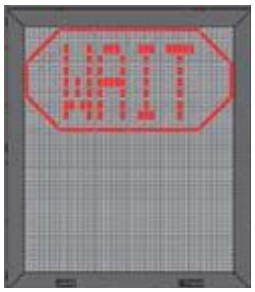
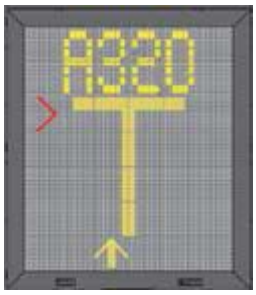
9.1 The Advanced-Visual Docking Guidance System (AVDGS) provides both pilots with guidance for manoeuvring the aircraft into the gate to the correct centerline and stop-position Aircraft parking visual docking guidance system.

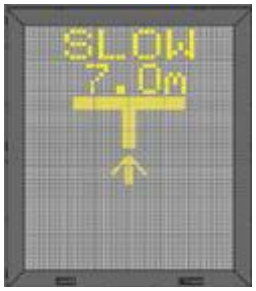
AVDGS is installed on stands A2, A4, B2 and B4.

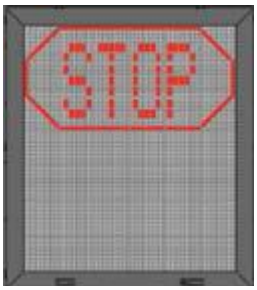
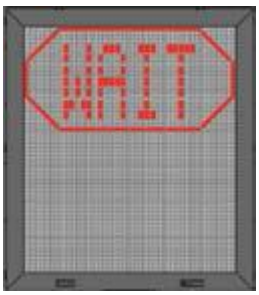
The Airport Authority will provide marshalling service for other aircraft not included on AVDGS .

In all other stands, the aircraft parking manoeuvre will be signaling by a marshaller.

9.2 AVDGS Procedure

1	START-OF-DOCKING The system is started by pressing one of the aircraft type buttons on the Operator Panel. When the button has been pressed, WAIT will be displayed.	
2	CAPTURE The floating arrows indicate that the system is activated and in capture mode, searching for an approaching aircraft. It shall be checked that the correct aircraft type is displayed. The lead-in line shall be followed. THE PILOT MUST NOT PROCEED BEYOND THE BRIDGE, UNLESS THE ARROWS HAVE BEEN SUPERSEDED BY THE CLOSING RATE BAR.	
3	TRACKING When the aircraft has been caught by the laser, the floating arrow is replaced by the yellow center line indicator. A flashing red arrow indicates the direction to turn. The vertical yellow arrow shows position in relation to the center line. This indicator gives correct position and azimuth guidance.	
4	CLOSING RATE The closing rate is the final countdown from a specific distance to the stop position. A yellow vertical closing rate bar/center line indicator appears with or without a digital countdown, depending on the configuration. The closing rate bar represents the distance from stop, it consists of a number of rows representing 0.5m per row. Each row turns	

	off as the aircraft approaches stop (reducing the length of the bar, bottom upwards) and as the last row turns off, less than the interval for one row remains until STOP appears. A digital countdown shows the distance to stop numerically, starting from 30 m. The digital countdown also uses different decrements during the closing rate process. • Metric digital count starting with 1 meter decrements from 30 m down to 2 m followed by 0.2 meter decrements from 2.0 down to 0.2 m and then followed by STOP. The pictures illustrate aircraft in the closing rate distance from stop position, slightly left of the center line. The red arrow indicates the direction to steer.	Meters (m)
5	ALIGNED TO CENTRE The aircraft is at the displayed distance from the stop position. The absence of any direction arrow indicates an aircraft on the center line.	 Meters (m)
6	SLOW (DECREASE SPEED) AVDGS is configured with a slowdown active zone (distances set from the stop position, between 6 to 24 meters) according to an acceptable docking speed (max allowed speed, 2 m/s). Note: When 2 m/s is rounded down to a single digit, it is approximately 7 km/h, 4 mph or 3 knots. If the aircraft is approaching faster than the accepted speed, the system will show 'SLOW' or 'SLOW DOWN' as a warning to the pilots.	 Meters (m)
7	AZIMUTH GUIDANCE The aircraft is at the displayed distance from the stop-position. The yellow arrow indicates an aircraft to the right of the center line, and the red flashing arrow indicates the direction to turn.	 Meters (m)

8	STOP POSITION REACHED When the correct stop-position is reached, the display will show STOP with a red border or with red lights.	
9	DOCKING COMPLETED When the aircraft has parked, OK will be displayed.	
10	CHOCK ON CHOCK ON will be displayed, when the ground staff has put the chocks in front of the nose wheel and press the "Chocks On" button on the Operator Panel	
11	STOP SHORT If the aircraft is found standing still but has not reached the intended stop position, the message STOP OK will be shown after a pre-configured time.	
12	WAIT If some object is blocking the view toward the approaching aircraft or the detected aircraft is lost during docking close to STOP, the display will show WAIT. The docking will continue as soon as the blocking object has disappeared or the system detects the aircraft again. THE PILOT MUST NOT PROCEED BEYOND THE BRIDGE, UNLESS THE "WAIT" MESSAGE HAS BEEN SUPERSEDED BY THE CLOSING RATE BAR.	

13	SLOW (IN ABNORMAL SITUATIONS) This display can be shown for two reasons: A) BAD WEATHER CONDITION During heavy fog, rain or snow, the visibility for the docking system can be reduced. When the system is activated and in capture mode, the display will disable the floating arrows and display SLOW and the Aircraft Type. As soon as the system detects the approaching aircraft, the vertical closing rate bar will appear. If the system has been configured in this mode to make a shortened ID verification (check of engine position excluded), the Aircraft symbol will blink to give attention. B) AIRCRAFT LOST DURING DOCKING If the aircraft is lost during docking far out from the bridge or PBB area, the display will show SLOW. As soon as the system detects the approaching aircraft, the vertical closing rate bar will re –appear. THE PILOT MUST NOT PROCEED BEYOND THE BRIDGE, UNLESS THE CLOSING RATE BAR IS SHOWN.	
14	AIRCRAFT VERIFICATION FAILURE During entry into the Stand, the aircraft geometry is being checked. If, for any reason, aircraft verification is not made 12 meters before the stop-position, the display will first show WAIT and make a second verification check. If this fails STOP and ID FAIL will be displayed. THE PILOT MUST NOT PROCEED BEYOND THE BRIDGE WITHOUT MANUAL GUIDANCE, UNLESS THE WAIT MESSAGE HAS BEEN SUPERSEDED BY THE CLOSING RATE BAR.	
15	TOO FAST If the aircraft approaches with a speed higher than the docking system can handle, the message STOP TOO FAST will be displayed. The docking system must be re-started or the docking procedure completed by manual guidance.	

10 PBN procedures

10.1 For RNAV(GNSS) SID and STAR aircraft must be approved by State of Registry in accordance with ICAO RNP1 standard or equivalent. Carriage of certified GNSS receiver is mandatory. Aircraft that do not have approval or whose RNP1/ P-RNAV capability has been degraded before departure shall use the Conventional Procedure.

10.2 To harmonize the implementation of PBN procedures, pilots of arriving aircraft to Macau International Airport are requested to report the type of approach on their initial contact with Macao ATC.

11 RNP AR approach

11.1 Special Authorization from AACM is required to conduct RNP AR APCH in Macao.

VMMC AD 2.21 NOISE ABATEMENT PROCEDURES

The following procedures govern operations at Macau International Airport:

1 Noise abatement operating restrictions

1.1 Departing aircraft

1.1.1 Take-off on runway 34 at any time

Climb offset 15° (right) to 400 ft (120 m), then turn RIGHT. Aircraft are NOT TO OVERSHOOT Jiuzhou DVOR (ZAO) R231° which defines the northern limit for flights taking off runway 34 due to NOISE ABATEMENT for Zhuhai City.

1.2 Arriving aircraft

1.2.1 Landing on runway 16 at any time

Maintain inbound track 215° (true north) on the localizer course. Aircraft are NOT TO DEVIATE FROM Jiuzhou DVOR (ZAO) R231° which defines the northern limit for flights landing runway 16 due to NOISE ABATEMENT for Zhuhai City.

1.3 Aircraft with ICAO Annex 16 Chapter 2 condition will only be considered in a case-by-case basis. For Chapter 2 noise aircraft, operation time between 00:00 - 08:00 local time is not allowed.

2 Aeroplane noise abatement operating procedures for take-off

NIL.

3 Training flight

3.1 Requests to carry out training flights, irrespective of the direction of landing and take-off, must be submitted in writing to the Chairman of Civil Aviation at least 24 hours in advance of any proposed training.

4 Engine tests and ground runs

Engine run-up are subject to the following conditions:

4.1 Normally engine runs above ground idle power are not permitted during the critical hours of 2200 to 0700 local time. Exception may be considered case by case, depending on actual operational analyses (e.g. time needed for engine run-up, expected movements, etc).

4.2 Engine Ground Run Procedures

4.2.1 An engine ground run is defined as any engine start up not associated with the planned aircraft departure. Maintenance or test running of jet engine not mounted on an aircraft is prohibited unless performed in a test cell of adequate design.

4.2.2 Normally, engine ground running at idle power for duration not exceeding 15 minutes may be conducted on aircraft parking bays with previous coordination with Airport Operation Coordination Centre (AOCC). Extension of such limitation is subject to AOCC approval depending on airport conditions. Power runs above idle for maintenance purpose must be conducted at designated areas.

4.2.3 Initial requests for a ground run at any time should be made by telephone to Airport Operation Coordination Centre. The airline or the engine test is responsible for ensuring that all safety precautions against injury to persons or damage to properties, aircraft, vehicles, marine vessels (when the jet blast is directed towards the sea) and equipment in the vicinity are adopted. When ready to conduct the engine run, clearance from Macau Ground on 121.725 MHz. A listening watch must be maintained on the frequency throughout the engine run. The aircraft anti-collision beacons must be activated for the entire duration and that Macau Ground should be advised on its completion.

VMMC AD 2.22 FLIGHT PROCEDURES

See AD Charts

VMMC AD 2.23 ADDITIONAL INFORMATION

1 Automatic Terminal Information Service (ATIS)

STATION	BROADCAST ON FREQUENCY	HOURS	CONTENTS	REMARKS
MACAU International Airport	126.4 MHz	24 hours	Continuous broadcast in voice by Aerodrome control: - Runway in use, - Surface wind, - Visibility, - Runway visual range when it is less than 1500m - Present weather - Cloud - Trend forecast - Aerodrome QNH, - Air temperature and Dew Point, - Any essential information considered to be useful to operation of aircraft e.g. low visibility operation in force, thunderstorms warnings, typhoon signal no. 8 or above, aerodrome surface conditions, unserviceability of navigation aids, type(s) of approach to be expected etc.	Pilots are required to acknowledge the identifier at first contact on the frequency of responsible approach control unit (Zhuhai APP 120.35 (124.25), Hong Kong radar 126.3 MHz and 119.1 MHz) if aircraft is arriving and on 118.0 / 121.725 MHz as appropriate (see AD 2.20) if aircraft is departing

2 GNSS RAIM Prediction Services and Associated NOTAM Information

GNSS RAIM availability prediction service and the associated NOTAM information related to GNSS availability will not be provided by AACM or Macau International Airport.

In accordance with ICAO Doc 9613, PBN Manual, aircraft operators shall subscribe the necessary information provided by other service providers to verify the RAIM availability for the intended route of flight.

Pages AD - VMMC - 27 to AD 2 - VMMC - 49 reserved for future development

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VMMC AD 2.24 CHARTS RELATED TO AN AERODROME

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AERONAUTICAL CHARTS

1 Introduction

Data are compiled from different sources. As exhaustive verification is not possible within limits of resources, it is not possible to guarantee absolute accuracy of all data shown on charts except on MACAU Special Administrative Region.

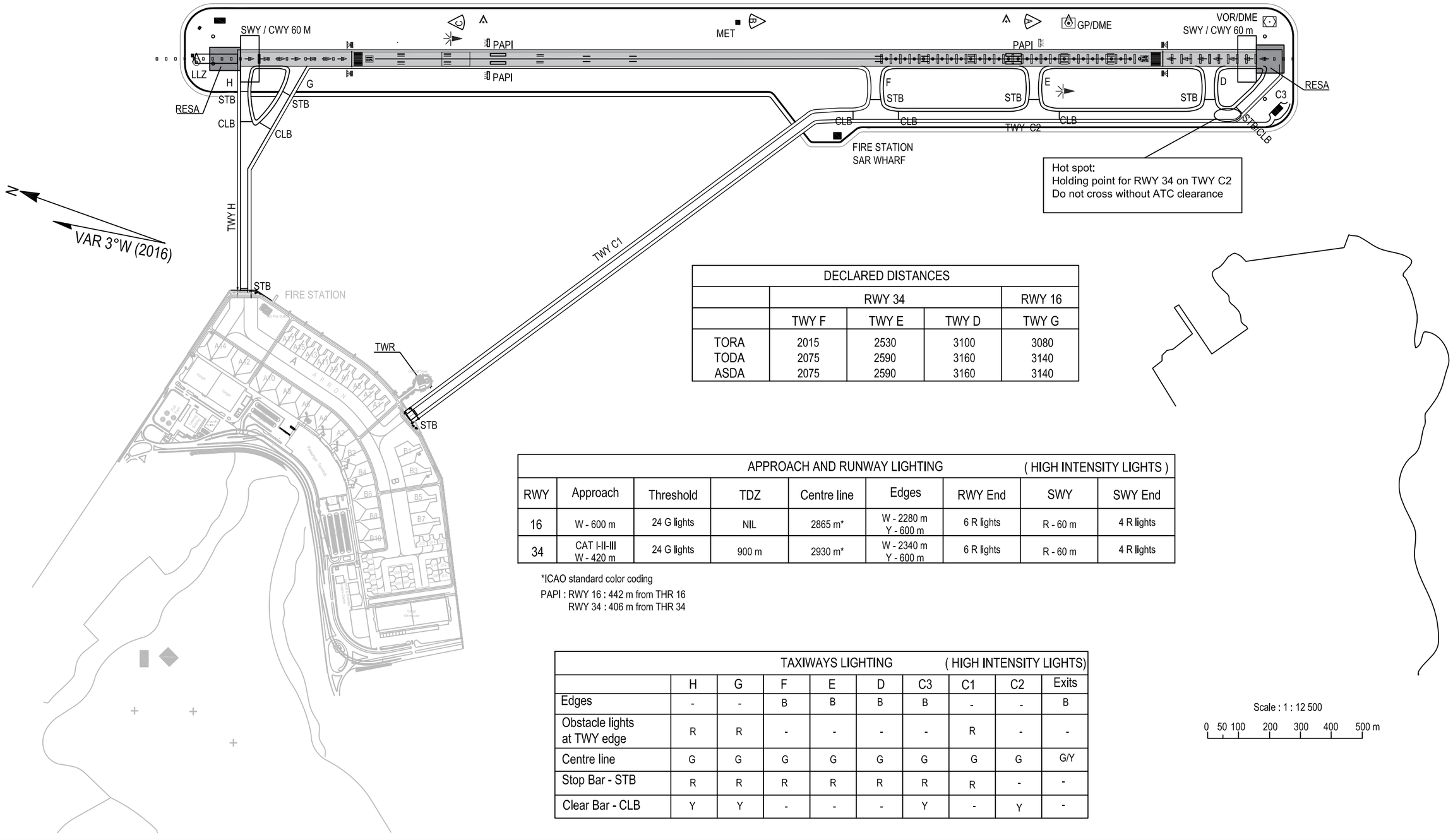
AERODROME CHART-ICAO

23 MAY 2019

ELEVATIONS IN FEET AMSL
DIMENSIONS IN METRES
BEARINGS ARE MAGNETIC

ELEV 20

LOW VISIBILITY OPERATION MINIMUM FOR TAKE-OFF = 175 METRES



DECLARED DISTANCES				
	RWY 34			RWY 16
	TWY F	TWY E	TWY D	TWY G
TORA	2015	2530	3100	3080
TODA	2075	2590	3160	3140
ASDA	2075	2590	3160	3140

APPROACH AND RUNWAY LIGHTING (HIGH INTENSITY LIGHTS)								
RWY	Approach	Threshold	TDZ	Centre line	Edges	RWY End	SWY	SWY End
16	W - 600 m	24 G lights	NIL	2865 m*	W - 2280 m Y - 600 m	6 R lights	R - 60 m	4 R lights
34	CAT I-II-III W - 420 m	24 G lights	900 m	2930 m*	W - 2340 m Y - 600 m	6 R lights	R - 60 m	4 R lights

*ICAO standard color coding

PAPI : RWY 16 : 442 m from THR 16
RWY 34 : 406 m from THR 34

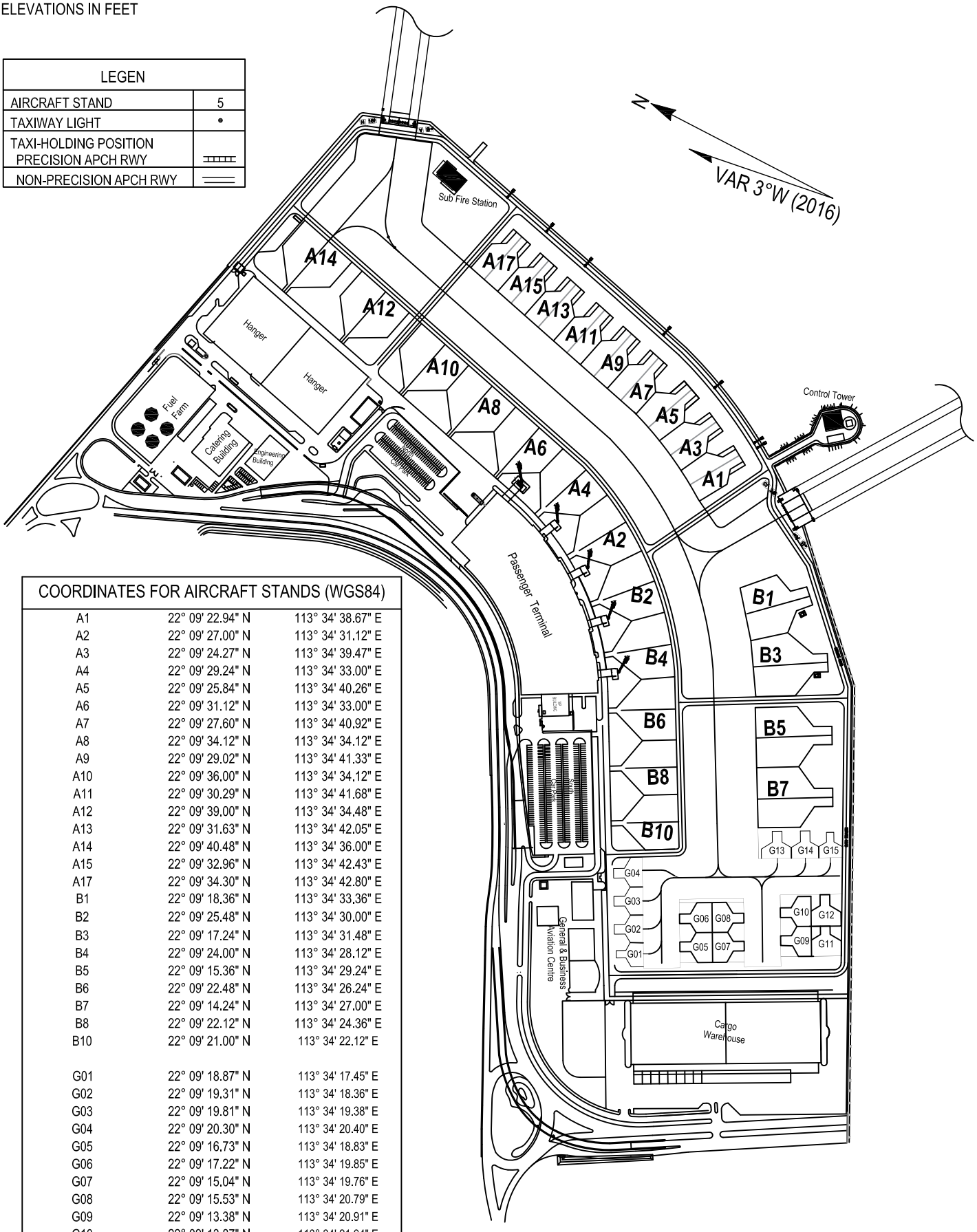
TAXIWAYS LIGHTING (HIGH INTENSITY LIGHTS)									
	H	G	F	E	D	C3	C1	C2	Exits
Edges	-	-	B	B	B	B	-	-	B
Obstacle lights at TWY edge	R	R	-	-	-	-	R	-	-
Centre line	G	G	G	G	G	G	G	G	G/Y
Stop Bar - STB	R	R	R	R	R	R	R	-	-
Clear Bar - CLB	Y	Y	-	-	-	Y	-	Y	-

Scale : 1 : 12 500

0 50 100 200 300 400 500 m

ELEVATIONS IN FEET

LEGEN	
AIRCRAFT STAND	5
TAXIWAY LIGHT	•
TAXI-HOLDING POSITION PRECISION APCH RWY	
NON-PRECISION APCH RWY	



COORDINATES FOR AIRCRAFT STANDS (WGS84)		
A1	22° 09' 22.94" N	113° 34' 38.67" E
A2	22° 09' 27.00" N	113° 34' 31.12" E
A3	22° 09' 24.27" N	113° 34' 39.47" E
A4	22° 09' 29.24" N	113° 34' 33.00" E
A5	22° 09' 25.84" N	113° 34' 40.26" E
A6	22° 09' 31.12" N	113° 34' 33.00" E
A7	22° 09' 27.60" N	113° 34' 40.92" E
A8	22° 09' 34.12" N	113° 34' 34.12" E
A9	22° 09' 29.02" N	113° 34' 41.33" E
A10	22° 09' 36.00" N	113° 34' 34.12" E
A11	22° 09' 30.29" N	113° 34' 41.68" E
A12	22° 09' 39.00" N	113° 34' 34.48" E
A13	22° 09' 31.63" N	113° 34' 42.05" E
A14	22° 09' 40.48" N	113° 34' 36.00" E
A15	22° 09' 32.96" N	113° 34' 42.43" E
A17	22° 09' 34.30" N	113° 34' 42.80" E
B1	22° 09' 18.36" N	113° 34' 33.36" E
B2	22° 09' 25.48" N	113° 34' 30.00" E
B3	22° 09' 17.24" N	113° 34' 31.48" E
B4	22° 09' 24.00" N	113° 34' 28.12" E
B5	22° 09' 15.36" N	113° 34' 29.24" E
B6	22° 09' 22.48" N	113° 34' 26.24" E
B7	22° 09' 14.24" N	113° 34' 27.00" E
B8	22° 09' 22.12" N	113° 34' 24.36" E
B10	22° 09' 21.00" N	113° 34' 22.12" E
G01	22° 09' 18.87" N	113° 34' 17.45" E
G02	22° 09' 19.31" N	113° 34' 18.36" E
G03	22° 09' 19.81" N	113° 34' 19.38" E
G04	22° 09' 20.30" N	113° 34' 20.40" E
G05	22° 09' 16.73" N	113° 34' 18.83" E
G06	22° 09' 17.22" N	113° 34' 19.85" E
G07	22° 09' 15.04" N	113° 34' 19.76" E
G08	22° 09' 15.53" N	113° 34' 20.79" E
G09	22° 09' 13.38" N	113° 34' 20.91" E
G10	22° 09' 13.87" N	113° 34' 21.94" E
G11	22° 09' 12.28" N	113° 34' 21.96" E
G12	22° 09' 12.78" N	113° 34' 23.01" E
G13	22° 09' 15.62" N	113° 34' 24.68" E
G14	22° 09' 14.66" N	113° 34' 25.21" E
G15	22° 09' 13.81" N	113° 34' 25.68" E

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MACAU

AERODROME OBSTACLE CHART - ICAO

TYPE A (OPERATING LIMITATIONS)

RWY 34

04 JAN 2018

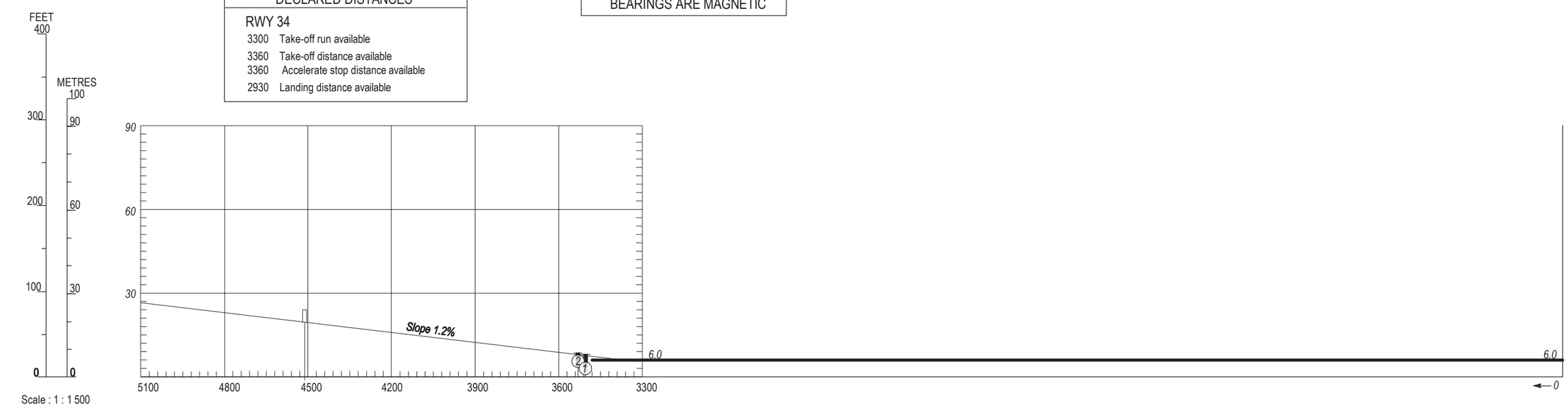
VAR 3°W (2016)

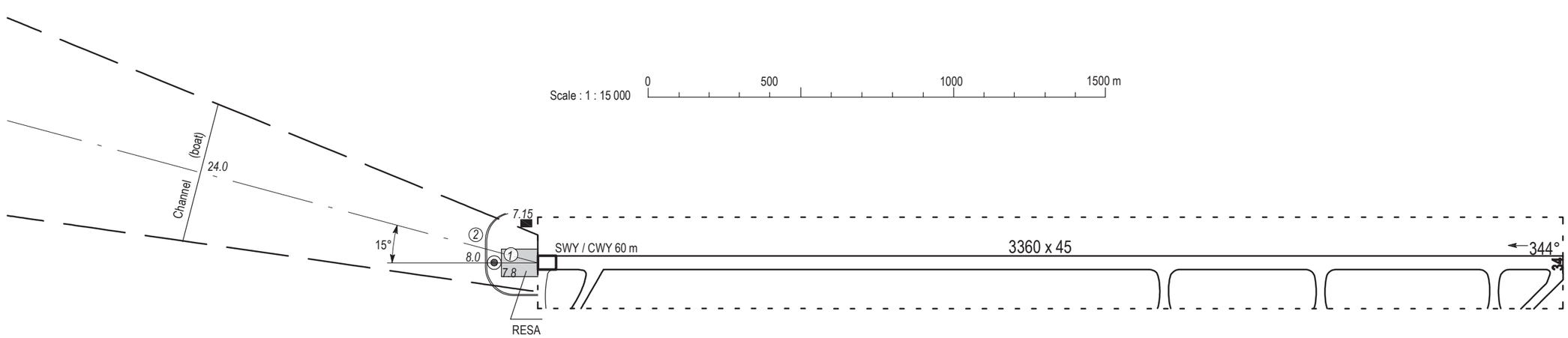
DIMENSIONS AND ELEVATIONS
IN METRES
BEARINGS ARE MAGNETIC

DECLARED DISTANCES

RWY 34

3300	Take-off run available
3360	Take-off distance available
3360	Accelerate stop distance available
2930	Landing distance available





LEGEN

NOTE : OBSTACLES ABOVE REFERENCE SURFACE INDICATED

- IDENTIFICATION NUMBER
- MAST, TOWER, SPIRE, ANTENNA, ETC...
- BUILDING OR LARGE
- TERRAIN PENETRATING OBSTRUCTION PLANE (PROFILE PRESENTATION)
- OBSTACLE PENETRATING OBSTRUCTION PLANE (PROFILE PRESENTATION)
- OBSTRUCTION PLANE (PROFILE PRESENTATION)
- OBSTACLES AREA

LIMITS ON ACCORDANCE WITH ICAO PRESCRIPTIONS

AMENDMENT RECORD		
NO□	DATE	ENTERED

MACAU

AERODROME OBSTACLE CHART - ICAO

TYPE A (OPERATING LIMITATIONS)

RWY 16

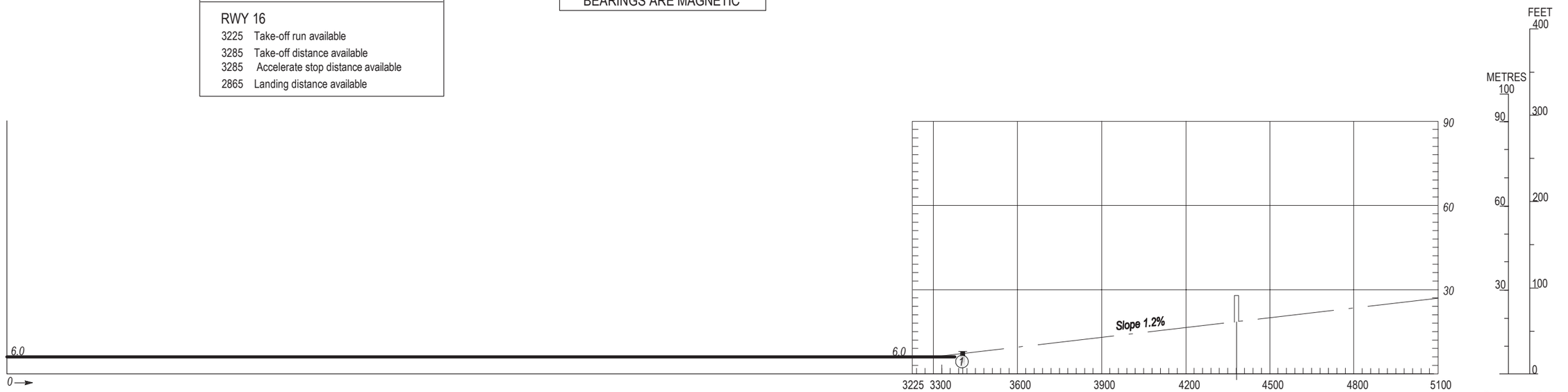
VAR 3°W (2016)

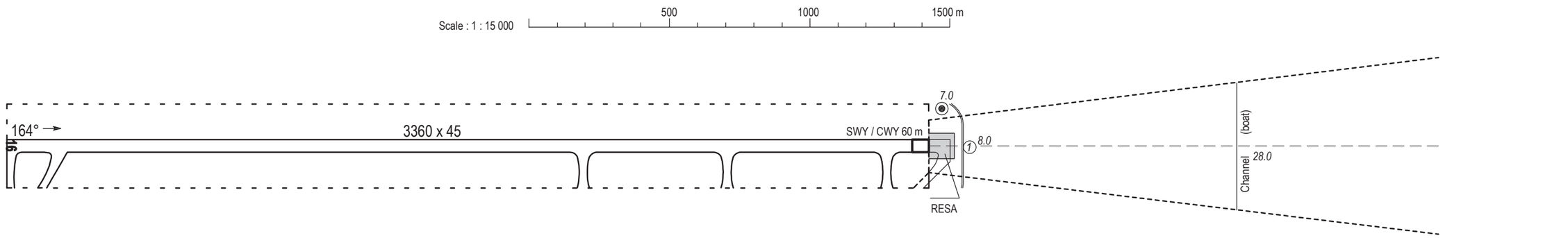
DECLARED DISTANCES

RWY 16

3225	Take-off run available
3285	Take-off distance available
3285	Accelerate stop distance available
2865	Landing distance available

DIMENSIONS AND ELEVATIONS IN METRES
BEARINGS ARE MAGNETIC





LEGEN

NOTE : OBSTACLES ABOVE REFERENCE SURFACE INDICATED

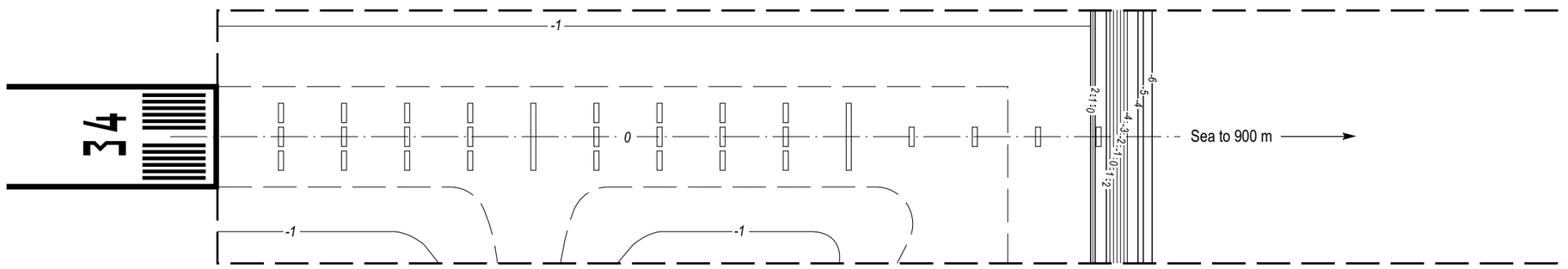
- IDENTIFICATION NUMBER
- MAST, TOWER, SPIRE, ANTENNA, ETC...
- BUILDING OR LARGE
- TERRAIN PENETRATING OBSTRUCTION PLANE (PROFILE PRESENTATION)
- OBSTACLE PENETRATING OBSTRUCTION PLANE (PROFILE PRESENTATION)
- OBSTRUCTION PLANE (PROFILE PRESENTATION)
- OBSTACLES AREA

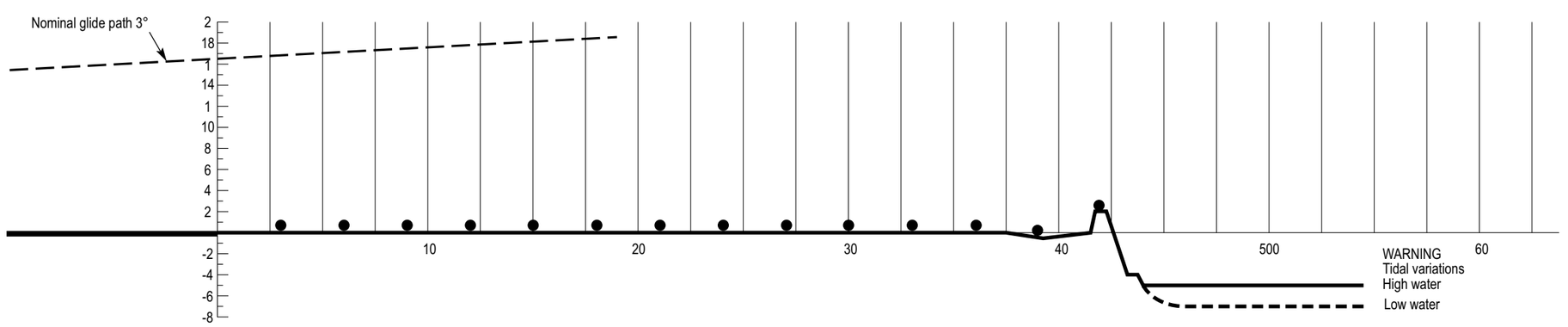
LIMITS ON ACCORDANCE WITH ICAO PRESCRIPTIONS

AMENDMENT RECORD

NO	DATE	ENTERED

DIMENSIONS AND ELEVATIONS
IN METRES





LEGEND	
BUILDING OR LARGE STRUCTURE	
CONTOUR	2
PROFILE OF EXTENDED RWY CENTRE LINE	
DEVIATION AT LEAST ± 3 M FROM CENTRELINE IN PROFILE	
APPROACH LIGHTING	

HORIZONTALE SCALE : 1: 2500
VERTICALE SCALE : 1: 500
CONTOURS AND HEIGHTS ARE RELATED TO THRESHOLD ELEVATION

AMENDMENT RECORD		
NO	DATE	ENTERED BY

1. Navigation aids related to Macao Instrument Flight Procedures:

Navigation aids	Frequency	Coordinates	
CH DVOR	112.3MHz	22°13’10.35”N	114°01’48.20”E
CH DME	CH 70X	22°13’11.69”N	114°01’48.75”E
CON DVOR/DME	113.0MHz/CH77X	23°35.3’N	113°35.2’E
GAOLAN NDB	UJ 204	21°55.2’N	113°17.6’E
GLN DVOR/DME	112.0MHz/CH57X	22°42.5’N	114°02.0’E
LKC DVOR/DME	113.2MHz/CH79X	22°22’44.12”N	113°53’01.50”E
MCU DVOR/DME	116.4MHz/CH111X	22°08’08”N	113°35’52”E
NLG DVOR/DME	117.7MHz/CH124X	22°31.9’N	113°33.7’E
POU DVOR/DME	114.1MHz/CH88X	23°01.3’N	113°11.4’E
SANZAO NDB	U 272	21°59.3’N	113°21.3’E
SHL DVOR/DME	115.7MHz/CH104X	23°05.5’N	113°51.0’E
SMT DVOR/DME	114.8MHz/CH95X	22°20’15.43”N	113°58’55.46”E
TD DVOR/DME	116.1MHz/CH108X	22°14’52.42”N	114°17’35.30”E
ZAO DVOR/DME	117.2MHz/CH119X	22°14.8’N	113°36.8’E

2. Way-Points related to Macao Instrument Flight Procedures:

Way-Point	Radial & Distance	Coordinates	
ALLEY	CH R194° DME 69.1 TD R205° DME 75.0	21°05’11.2”N	113°47’09.5”E
ATIKO		21 48 29.56N	113 32 26.04E
BIGRO		21°34.2’N	111°49.6’E
BOKAT		22°02.3’N	113°00.0’E
BREAM		21°46’46.00”N	114°03’28.00”E
BUMDI		22°21’39.62”N	114°18’52.61”E
CAMRI	LKC R156° DME 23.4 SMT R167° DME 19.1	21°01’46.2”N	114°04’28.7”E
CHALI	CH R206° DME 60.0	21°17’45.00”N	113°36’41.00”E
CONGA	CH R103° DME 156.3 TD R105° DME 142.3	21°44’02.5”N	116°47’05.9”E

DOCTA	LKC R168° DME 26.8 SMT R179° DME 23.4	21°56’49.5”N	114°00’33.4”E
FUSU	CON R191° DME 32.5	23°03.2’N	113°30.5’E
GRUPA	CH R130° DME 135.2 TD R135° DME 125.0	20°50’44.0”N	115°56’59.0”E
GURIN	MCU R246° DME 37.0	21°51.1’N	113°00.0’E
HAZEL	LKC R211° DME 24.0	22°01’26.49”N	113°40’56.63”E
IDUMA	GLN R341° DME 12.1 SHL R157 ° DME 13.0	22°53.8’N	113°57.1’E
INDUS		22°02’41.0”N	113°36’01.0”E
KIBAS		22°08.3’N	113°14.5’E
LAKES	CH R109° DME 51.1 TD R118° DME 38.0	21°58’41.3”N	114°54’38.6”E
LATOP	MCU DME 9.0 ZAO R041° NLG R167° DME 15.6	22°16.9’N	113°38.6E
MIPAG	GLN R311° DME 20.6	22° 55.3’N	113° 44.5’E
MULET	MCU R164° DME 35	21°35’02.0”N	113°47’52.0”E
OCEAN	CH R122° DME 50.0 TD R135° DME 39.0	21°48’43.0”N	114°48 48.0’E
Papa “P”	MCU R164° DME 10.0	21°58’39”N	113°39’22”E
PECAN	CH R183° DME 46.7 TD R200° DME 50.5	21°26’20.2”N	114°02’05.6”E
RASSE	CH R112° DME 76.9 TD R118° DME 63.9	21°47’34.5”N	115°19’49.1”E
Romeo “R”	MCU R209° DME 18.0	21°51.8’N	113°26.9’E
RUNLI	CH R206° DME 50.0	21°26’59.72”N	113°40’51.00”E
SAREX	POU R120° DME 18.2 CON R191° DME 43.0	22°52.9’N	113°29.0’N
SHELY	TD R118° DME 22.2	22°05’26.65”N	114°39’13.94”E
SKATE	CH R126° DME 74.5 TD R135° DME 64.0	21°31’55.0”N	115°08’40.0”E
SOUSA	CH R098° DME 121.0 TD R100° DME 106.6	22°01’10.4”N	116°11’27.8”E
TITAN	CH R181° DME 32.6 TD R205° DME 36.9	21°40’27.4”N	114°03’02.5”E

TUNNA	CH R191° DME 25.9 NLG R156° DME 49.7	21°47’25.0”N	113°57’54.0”E

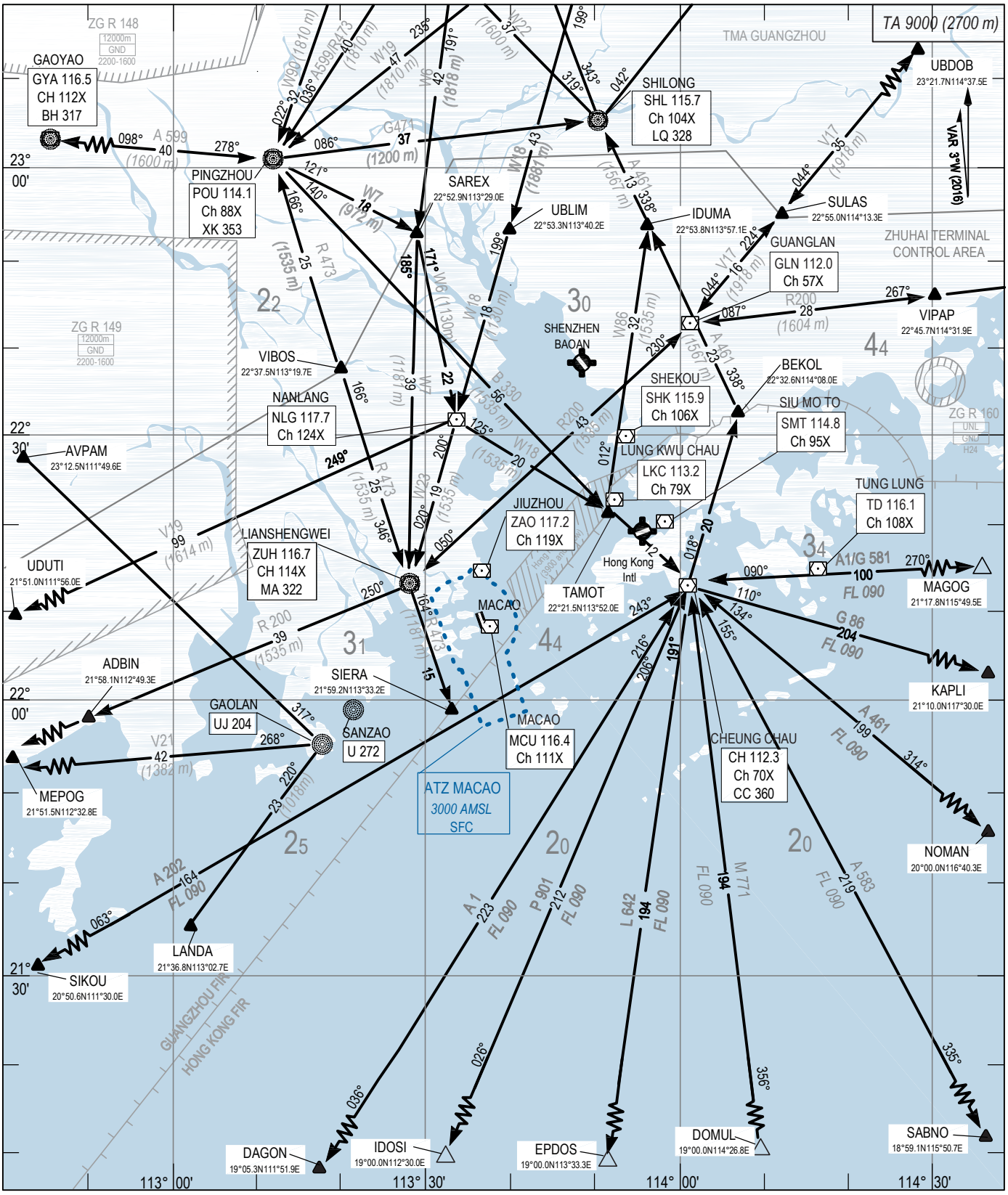
3. Way-Points related to Macao RNP Flight Procedures:

Waypoint	Coordinates (WGS84)	
RW16	22°09′38.31″N	113°35′14.14″E
RW34	22°08′17.46″N	113°35′43.91″E
MC411	22°21′41.20″N	113°47′37.58″E
MC417	22°21′22.48″N	113°25′20.13″E
MC418	22°20′59.43″N	113°37′16.98″E
MC419	22°26′25.37″N	113°46′47.49″E
MC420	22°20′32.29″N	113°41′43.59″E
MC501	22°00′03.00″N	113°38′45.76″E
MC502	22°02′43.76″N	113°00′50.39″E
MC508	22°12′25.79″N	113°34′59.76″E
MC509	22°14′34.78″N	113°36′37.67″E
MC510	22°17′02.13″N	113°38′29.61″E
MC511	22°21′49.23″N	113°36′58.39″E
MC512	22°21′49.25″N	113°33′45.41″E
MC513	22°01′09.95″N	113°37′20.04″E
MC514	22°06′52.19″N	113°32′56.82″E
MC516	22°12′48.00″N	113°28′24.00″E
MC601	22°19′43.55″N	113°56′43.60″E
MC608	22°11′14.42″N	113°34′38.75″E
MC609	22°02′35.07″N	113°37′49.87″E
MC610	21°52′31.46″N	113°41′36.15″E
MC611	21°39′36.00″N	113°46′30.00″E
MC612	21°50′42.92″N	113°36′08.19″E
MC613	21°54′20.84″N	113°34′45.32″E
MC614	21°58′12.27″N	113°36′03.19″E
MC615	22°18′12.10″N	113°50′26.77″E

MC800	22°19'24.7490"N	113°37'43.8130"E
MC802	22°17'31.0330"N	113°38'19.5450"E
MC806	22°14'58.1330"N	113°37'25.5250"E
MC808	22°14'12.4680"N	113°36'21.1390"E
MC810	22°13'20.0870"N	113°35'07.3230"E
MC812	22°11'32.2130"N	113°34'32.1820"E
MC820	22°07'12.5500"N	113°36'07.8040"E
MC822	22°04'45.1840"N	113°37'02.0200"E
MCC80	22°16'51.1470"N	113°35'53.0160"E
MCC82	22°12'03.4710"N	113°36'10.0330"E
MCC84	22°02'24.8370"N	113°29'43.4130"E

TWR :	MACAO Tower	118.0
APP :	ZHUHAI Approach	120.35 (124.25) (1)
APP :	HONG KONG Radar	126.3 / 119.1 (2)
ATIS :	MACAO	126.4

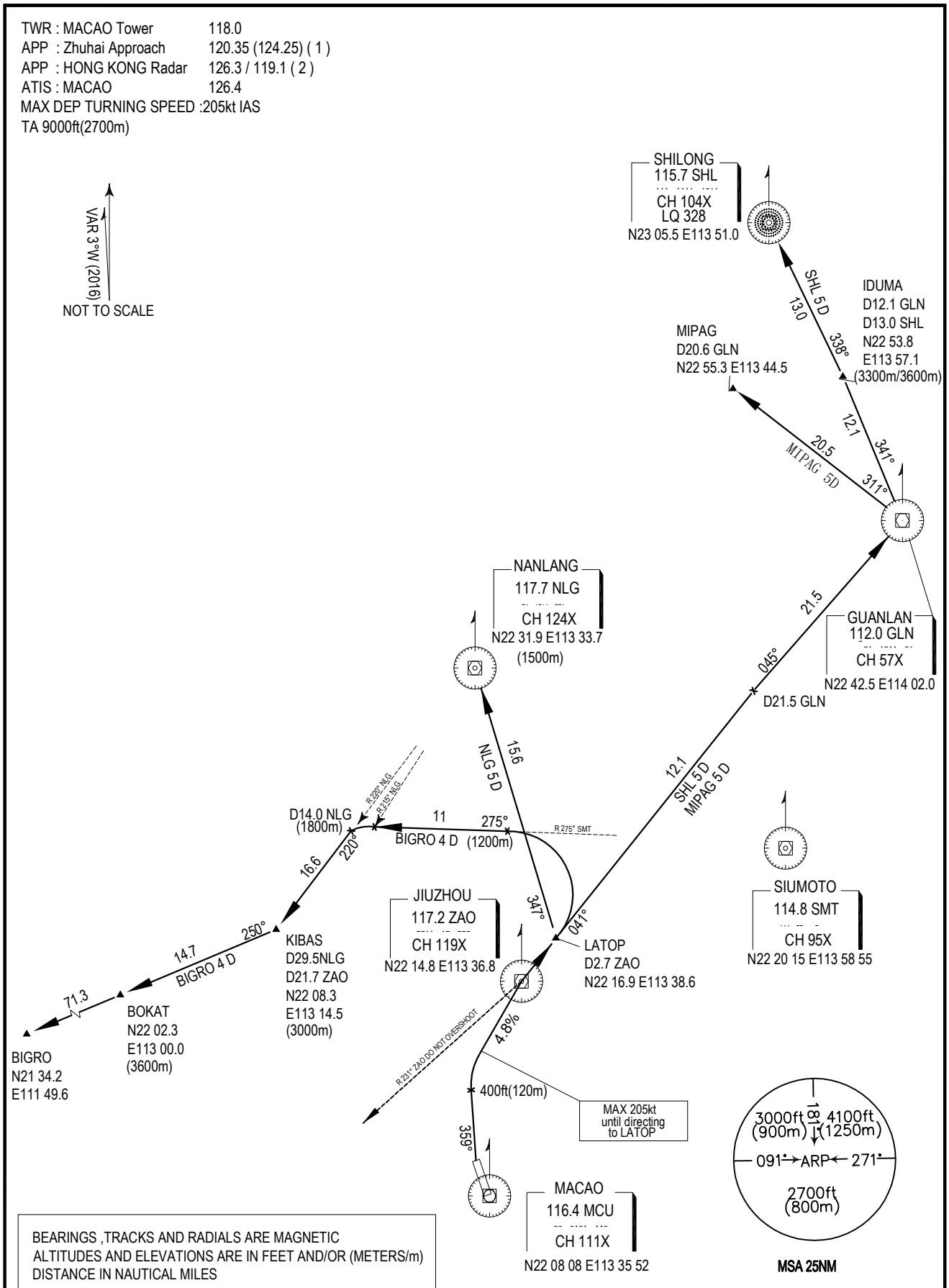
BEARINGS, TRACKS AND RADIALS ARE MAGNETIC
ALTITUDES AND ELEVATIONS ARE IN FEET AND /OR (METERS / m)
DISTANCES IN NAUTICAL MILES



RADIO FAILURE PROCEDURE : Squawk A / 7600

GUANG ZHOU FIR - HONG KONG FIR
SID MACAO RWY 34
(BIGRO 4 D, MIPAG 5 D, NLG 5 D, SHL 5 D)
CAT A, B, C, D

TWR : MACAO Tower 118.0
APP : Zhuhai Approach 120.35 (124.25) (1)
APP : HONG KONG Radar 126.3 / 119.1 (2)
ATIS : MACAO 126.4
MAX DEP TURNING SPEED :205kt IAS
TA 9000ft(2700m)



BEARINGS ,TRACKS AND RADIALS ARE MAGNETIC
ALTITUDES AND ELEVATIONS ARE IN FEET AND/OR (METERS/m)
DISTANCE IN NAUTICAL MILES

Radio Failure Procedure : Squawk A / 7600

BIGRO 4 D (minimum climb gradient of 4.8% required until leaving 1800 m)
Depart on track 359°M and climb to 400 ft (120 m). Then turn right and continue climb to ZAO. Leave ZAO on R041°. Turn left at LATOP to intercept SMT R275° at 1200 m. Then continue climbing, at NLG R215° turn left to intercept NLG R220° at 1800 m. To NLG R220° DME 29.5 at 3000 m, turn right at heading 250°M, to BOKAT at 3600 m, to BIGRO.

MIPAG 5 D (minimum climb gradient of 4.8% required until leaving 3300m)
Depart on track 359°M and climb to 400 ft (120 m). Turn right to ZAO and continue climbing to 3300 m and maintain. On ZAO R041°, at GLN DME 21.5 turn right on GLN R225° to GLN, turn left on GLN R311° to MIPAG.

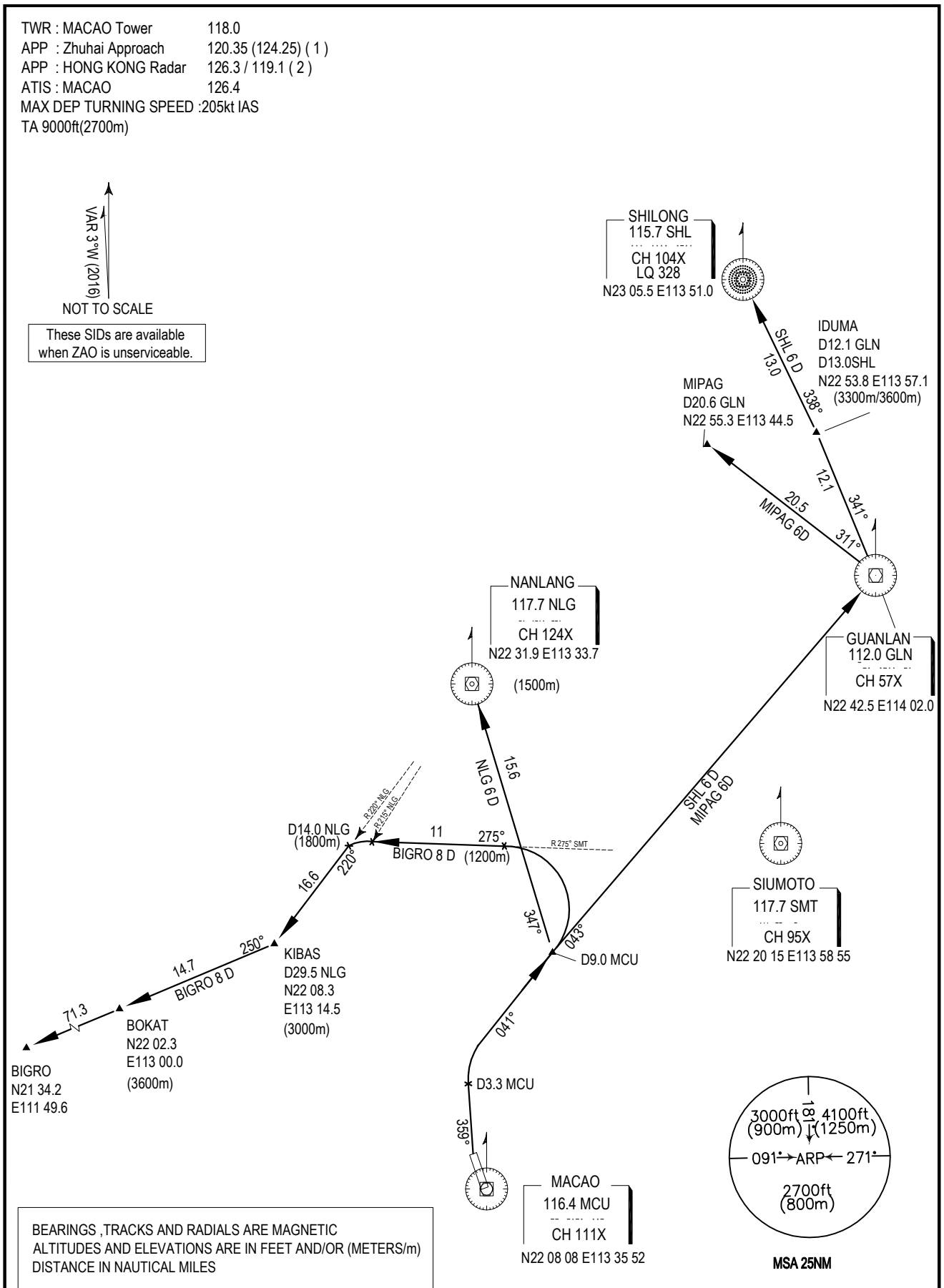
NLG 5 D (minimum climb gradient of 4.8% required until reaching 1500 m)
Depart on track 359°M and climb to 400 ft (120 m). Then turn right and continue climb to ZAO. Leave ZAO on R041°. At LATOP turn left to establish on NLG R167° and reach 1500m by NLG.

SHL 5 D (minimum climb gradient of 4.8% required until leaving 3300m)
Depart on track 359°M and climb to 400 ft (120 m). Then turn right and continue climb to ZAO. Leave ZAO on R041°, continue climbing to 3300 m and maintain, at GLN DME 21.5 proceed on GLN R225° to GLN. Leave GLN on R341° to IDUMA at 3300 m/3600 m. Turn left at IDUMA and proceed to SHL via SHL R158°.

REMARK:
(1) Aircraft are NOT TO OVERSHOOT JIUZHOU DVOR (ZAO 117.2 MHz) R231° which defines the northern limit for flights taking off RWY 34 due to NOISE ABATEMENT for Zhuhai City.
(2) Aircraft unable to comply with the minimum climb gradient must inform Macao ground control at first contact to allow special coordination.
(3) Maximum departure turning speed: 205 kt IAS.
(4) Owing to the proximity of the Hong Kong international airport, pilots departing on RWY 34 towards Hong Kong direction are reminded the need to follow the standard SID track until LKC DVOR. Any deviation from the standard SID track could result in direct conflict with Hong Kong traffic.

GUANG ZHOU FIR - HONG KONG FIR
SID MACAO RWY 34
(BIGRO 8 D, MIPAG 6 D, NLG 6 D, SHL 6 D)
CAT A, B, C, D

TWR : MACAO Tower 118.0
APP : Zhuhai Approach 120.35 (124.25) (1)
APP : HONG KONG Radar 126.3 / 119.1 (2)
ATIS : MACAO 126.4
MAX DEP TURNING SPEED :205kt IAS
TA 9000ft(2700m)



BEARINGS ,TRACKS AND RADIALS ARE MAGNETIC
ALTITUDES AND ELEVATIONS ARE IN FEET AND/OR (METERS/m)
DISTANCE IN NAUTICAL MILES

Radio Failure Procedure : Squawk A / 7600

BIGRO 8 D (minimum climb gradient of 4.8% required until leaving 1800 m)
Depart on track 359°M, at MCU DME 3.3NM turn right on track 041°M and continue climbing. Turn left at MCU DME 9.0NM to intercept SMT 275° at 1200m. Then continue climbing, at NLG R215° turn left to intercept NLG R220° at 1800m. To NLG R220° DME 29.5 at 3000 m, turn right at heading 250°M, to BOKAT at 3600 m, to BIGRO.

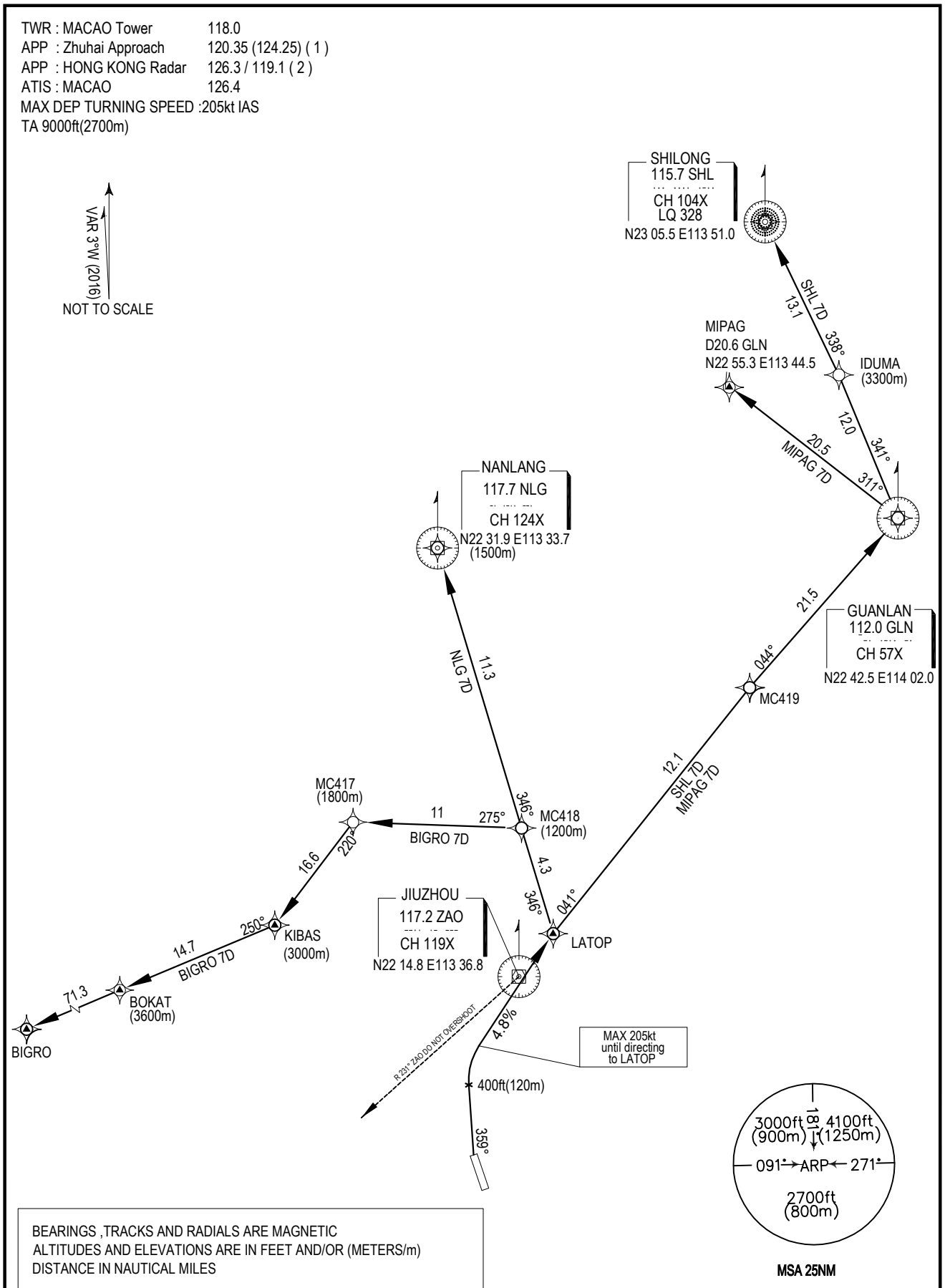
MIPAG 6 D (minimum climb gradient of 4.8% required until leaving 3300m)
Depart on track 359°M, at MCU DME 3.3NM turn right on track 041°M and continue climbing. By MCU DME 9.0NM establish on GLN R223°, continue climbing to 3300m and maintain, to GLN, turn left on GLN R311° to MIPAG.

NLG 6 D (minimum climb gradient of 4.8% required until reaching 1500 m)
Depart on track 359°M, at MCU DME 3.3NM turn right on track 041°M an1 continue climbing. At MCU DME 9.0NM turn left to establish on NLG R167° and reach 1500m by NLG.

SHL 6 D (minimum climb gradient of 4.8% required until leaving 3300m)
Depart on track 359°M, at MCU DME 3.3NM turn right on track 041°M and continue climbing. By MCU DME 9.0NM establish on GLN R223°, continue climbing to 3300m and maintain. Leave GLN on R341° to IDUMA at 3300m. Turn left at IDUMA and proceed to SHL via SHL R158°.

REMARK:
(1) These SIDs are available when ZAO is unserviceable.
(2) Aircraft unable to comply with the minimum climb gradient must inform Macao ground control at first contact to allow special coordination.
(3) Maximum departure turning speed: 205 kt IAS.
(4) Owing to the proximity of the Hong Kong international airport, pilots departing on RWY 34 towards Hong Kong direction are reminded the need to follow the standard SID track until LKC DVOR. Any deviation from the standard SID track could result in direct conflict with Hong Kong traffic.

GUANG ZHOU FIR - HONG KONG FIR
RNAV(GNSS) SID MACAO RWY 34
(BIGRO 7 D, MIPAG 7 D, NLG 7 D, SHL 7 D)
CAT A, B, C, D



The procedure applied to BASIC RNP1, GNSS required.

BIGRO 7 D (minimum climb gradient of 4.8% required until leaving 1800 m)
Climb on track 359°M, at 400 ft (120 m) turn right. Direct to LATOP, to MC418 at 1200m, turn left to MC417 at 1800 m, to KIBAS at 3000 m, to BOKAT at 3600 m and BIGRO.

MIPAG 7 D (minimum climb gradient of 4.8% required until leaving 3300m)
Climb on track 359°M, at 400 ft (120 m) turn right. Direct to LATOP, MC419, GLN, Turn left to MIPAG.

NLG 7 D (minimum climb gradient of 4.8% required until reaching 1500 m)
Climb on track 359°M, at 400 ft (120 m) turn right. Direct to LATOP, to MC418 at 1200m and to NLG at 1500m.

SHL 7 D (minimum climb gradient of 4.8% required until leaving 3300m)
Climb on track 359°M, at 400 ft (120 m) turn right. Direct to LATOP, MC419, GLN. Turn left to IDUMA at 3300 m and SHL.

REMARK :
(1) For $RNAV_{(GNSS)}$ SID aircraft must be approved by State of Registry in accordance with ICAO RNP1 standard or equivalent. Carriage of certified GNSS receiver is mandatory.
(2) Aircraft that do not have approval or whose RNP1/ P-RNAV capability has been degraded before departure shall use the Conventional Departure Procedure: BIGRO 5 D, MIPAG 5 D, NLG 5 D, SHL 5 D, BIGRO 6 D, MIPAG 6 D, NLG 6 D or SHL 6 D.
(3) Aircraft are NOT TO OVERSHOOT JIUZHOU DVOR (ZAO 117.2 MHz) R231° which defines the northern limit for flights taking off RWY 34 due to NOISE ABATEMENT for Zhuhai City.
(4) Aircraft unable to comply with the minimum climb gradient must inform Macao ground control at first contact to allow special coordination.
(5) Maximum departure turning speed: 205 kt IAS.
(6) Owing to the proximity of the Hong Kong international airport, pilots departing on RWY 34 towards Hong Kong direction are reminded the need to follow the standard SID track until LKC DVOR. Any deviation from the standard SID track could result in direct conflict with Hong Kong traffic.

FMC Database Coding Reference for $RNAV_{(GNSS)}$ SIDs

BIGRO 7 D

Sequence Number	Path Terminator	Waypoint	Fly-over	Track °M (°T)	Distance (NM)	Turn Dir	Altitude (ft)	Speed (knot)
001	CA	—	—	359(356)	—	R	400	-205
002	DF	LATOP	—	—	—	R	—	-205
003	TF	MC418	—	346(343)	4.3	—	3900	—
004	TF	MC417	—	275(272)	11	—	5900	—
005	TF	KIBAS	—	220(217)	16.6	—	9800	—
006	TF	BOKAT	—	250(247)	14.7	—	11800	—
007	TF	BIGRO	—	250(247)	71.3	—	—	—
001	IF	BIGRO	—	—	—	—	—	–

MIPAG 7 D

Sequence Number	Path Terminator	Waypoint	Fly-over	Track °M (°T)	Distance (NM)	Turn Dir	Altitude (ft)	Speed (knot)
001	CA	—	—	359(356)	—	R	400	-205
002	DF	LATOP	—	—	—	R	—	-205
003	TF	MC419	—	041(038)	12.1	—	—	—
004	TF	GLN	—	044(041)	21.5	—	—	—
005	TF	MIPAG	—	311(308)	20.5	L	—	—

NLG 7 D

Sequence Number	Path Terminator	Waypoint	Fly-over	Track °M (°T)	Distance (NM)	Turn Dir	Altitude (ft)	Speed (knot)
001	CA	—	—	359(356)	—	R	400	-205
002	DF	LATOP	—	—	—	R	—	-205
003	TF	MC418	—	346(343)	4.3	—	3900	—
004	TF	NLG	—	346(343)	11.3	—	4900	—

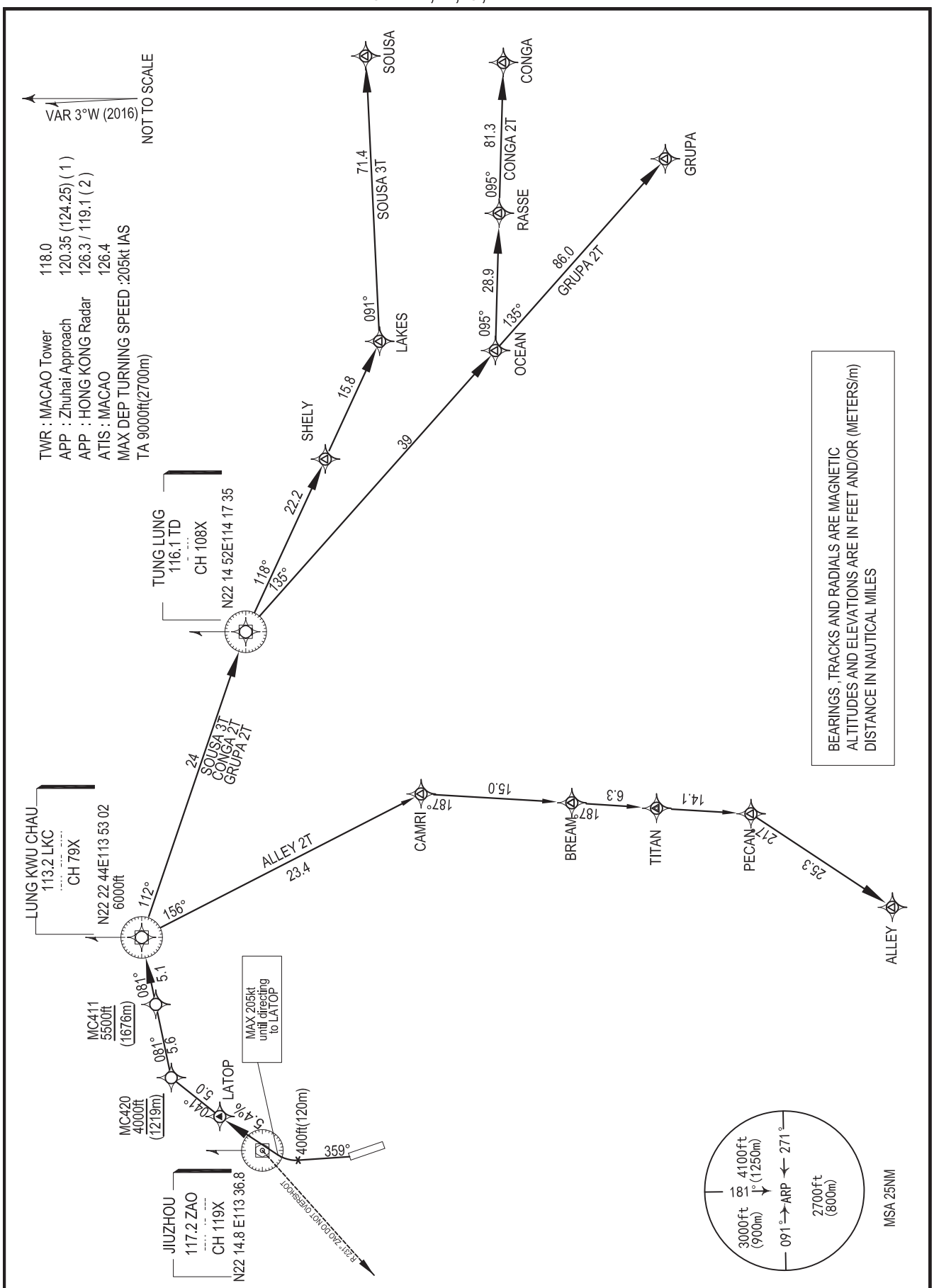
SHL 7 D

Sequence Number	Path Terminator	Waypoint	Fly-over	Track °M (°T)	Distance (NM)	Turn Dir	Altitude (ft)	Speed (knot)
001	CA	—	—	359(356)	—	R	400	-205
002	DF	LATOP	—	—	—	R	—	-205
003	TF	MC419	—	041(038)	12.1	—	—	—
004	TF	GLN	—	044(041)	21.5	—	—	—
005	TF	IDUMA	—	341(338)	12.0	—	10800	—
006	TF	SHL	—	338(335)	13.1	—	—	—

Waypoint Coordinates

Waypoint Name	Coordinates (WGS84)	
LATOP	22°16.9′N	113°38.6′E
MC418	22°20′59.43″N	113°37′16.98″E
MC417	22°21′22.48″N	113°25′20.13″E
KIBAS	22°08.3′N	113°14.5′E
BOKAT	22°02.3′N	113°00.0′E
NLG	22°31.9′N	113°33.7′E
MC419	22°26′25.37″N	113°46′47.49″E
MIPAG	22°55.3′N	113°44.5′E
GLN	22°42.5′N	114°02.0′E
IDUMA	22°53.8′N	113°57.1′E
SHL	23°05.5′N	113°51.0′E

GUANG ZHOU FIR - HONG KONG FIR
RNAV(GNSS) SID MACAO RWY 34
(ALLEY 2 T, CONGA 2 T, GRUPA 2 T, SOUSA 3 T)
CAT A, B, C, D



The procedure applied to BASIC RNP1,GNSS required.

ALLEY 2 T (minimum climb gradient of 5.4% required until leaving 5500 ft)
limb on track 359°M, at 400 ft (120 m) turn right. Direct to LATOP, turn right to MC420 at or above 4000 ft (1219m), to MC411 at or above 5500 ft (1676m), to LKC at 6000 ft. Further climb when instructed by ATC. To CAMRI, BREAM, TITAN, PECAN and ALLEY. Continue on Terminal Transition Routes published in Hong Kong AIP.

CONGA 2 T (minimum climb gradient of 5.4% required until leaving 5500 ft)
Climb on track 359°M, at 400 ft (120 m) turn right. Direct to LATOP, turn right to MC420 at or above 4000 ft (1219m), to MC411 at or above 5500 ft (1676m), to LKC at 6000 ft. Further climb when instructed by ATC. To TD, OCEAN, RASSE and CONGA. Continue on Terminal Transition Routes published in Hong Kong AIP.

GRUPA 2 T (minimum climb gradient of 5.4% required until leaving 5500 ft)
Climb on track 359°M, at 400 ft (120 m) turn right. Direct to LATOP, turn right to MC420 at or above 4000 ft (1219m), to MC411 at or above 5500 ft (1676m), to LKC at 6000 ft. Further climb when instructed by ATC. To TD, OCEAN and GRUPA. Continue on Terminal Transition Routes published in Hong Kong AIP.

SOUSA 3 T (minimum climb gradient of 5.4% required until leaving 5500 ft)
Climb on track 359°M, at 400 ft (120 m) turn right. Direct to LATOP, turn right to MC420 at or above 4000 ft (1219m), to MC411 at or above 5500 ft (1676m), to LKC at 6000 ft. Further climb when instructed by ATC. To TD, SHELY, LAKES and SOUSA. Continue on Terminal Transition Routes published in Hong Kong AIP.

REMARK:
(1) For RNAV(GNSS) SID aircraft must be approved by State of Registry in accordance with ICAO RNP1 standard or equivalent. Carriage of certified GNSS receiver is mandatory.
(2) Aircraft that do not have approval or whose RNP1/ P-RNAV capability has been degraded before departure shall use the Conventional Departure Procedure:

Depart on track 359°M and climb to 400 ft (120 m). Then turn right and continue climb to ZAO. Leave ZAO on R041° climbing to 4000 ft, at LKC DME11.5 (MCU DME 12.5) turn right to establish on LKC R261°, continue climbing to pass 5500 ft by LKC DME 5.0 and reach 6000 ft by LKC. Further climb when instructed by ATC. From LKC expect radar vectors to ***ALLEY, CONGA, GRUPA*** *or* ***SOUSA.***

If ZAO is unserviceable, depart on track 359°M, at MCU DME 3.3 turn right on track 041°M. Then turn right by MCU DME 13.1(LKC DME 11.4) at altitude 4000ft to intercept LKC R261°. Continue climbing to pass 5500ft by LKC DME 5.0 and reach 6000ft by LKC. Further climb when instructed by ATC. From LKC expect radar vectors to ***ALLEY, CONGA, GRUPA*** *or* ***SOUSA.***

If LKC is not available, request ***ALLEY 1 V, CONGA 1 V, GRUPA 1 V or SOUSA 2 V.***

(3) Aircraft are NOT TO OVERSHOOT ZAO DVOR R231° which defines the northern limit for flights taking off RWY 34 due to NOISE ABATEMENT for Zhuhai City.
(4) Procedure Design Gradient based only on airspace restriction.
(5) Aircraft unable to comply with the minimum climb gradient must inform MACAO ground control at first contact to allow special coordination.
(6) Maximum departure turning speed: 205 kt IAS until directing to LATOP.
(7) Aircraft shall fly at 250 kt or less below FL 110 transiting Hong Kong Airspace
(8) In the event of loss of communication, aircraft shall comply with the last acknowledged clearance up to the next reporting point in the SID, then climb to the flight planned cruising level and follow the flight planned route to join the appropriate airway.
(9) Owing to the proximity of the Hong Kong International Airport, pilots departing on RWY 34 towards Hong Kong direction are reminded the need to follow the standard SID track until LKC DVOR. Any deviation from the standard SID track could result in direct conflict with Hong Kong traffic.

FMC Database Coding Reference for RNAV(GNSS) SIDs

ALLEY 2 T

Sequence Number	Path Terminator	Waypoint	Fly-over	Track °M (°T)	Distance (NM)	Turn Dir	Altitude (ft)	Speed (knot)
001	CA	—	—	359 (356)	—	R	400	-205
002	DF	LATOP	—	—	—	R	—	-205
003	TF	MC420	—	041(038)	5.0	—	+4000	—
004	TF	MC411	—	081(078)	5.6	—	+5500	—
005	TF	LKC	—	081(078)	5.1	—	6000	—
006	TF	CAMRI	—	156(153)	23.4	—	—	—
007	TF	BREAM	—	187(184)	15	—	—	—
008	TF	TITAN	—	187(184)	15	—	—	—
009	TF	PECAN	—	187(184)	14.1	—	—	—
010	TF	ALLEY	—	217(214)	25.3	—	—	—

CONGA 2 T

Sequence Number	Path Terminator	Waypoint	Fly-over	Track °M (°T)	Distance (NM)	Turn Dir	Altitude (ft)	Speed (knot)
001	CA	—	—	359 (356)	—	R	400	-205
002	DF	LATOP	—	—	—	R	—	-205
003	TF	MC420	—	041(038)	5.0	—	+4000	—
004	TF	MC411	—	081(078)	5.6	—	+5500	—
005	TF	LKC	—	081(078)	5.1	—	6000	—
006	TF	TD	—	112(109)	24	—	—	—
007	TF	OCEAN	—	135(132)	39	—	—	—
008	TF	RASSE	—	095(092)	28.9	—	—	—
009	TF	CONGA	—	095(092)	81.3	—	—	—

GRUPA 2 T

Sequence Number	Path Terminator	Waypoint	Fly-over	Track °M (°T)	Distance (NM)	Turn Dir	Altitude (ft)	Speed (knot)
001	CA	—	—	359 (356)	—	R	400	-205
002	DF	LATOP	—	—	—	R	—	-205
003	TF	MC420	—	041(038)	5.0	—	+4000	—
004	TF	MC411	—	081(078)	5.6	—	+5500	—
005	TF	LKC	—	081(078)	5.1	—	6000	—
006	TF	TD	—	112(109)	24	—	—	—
007	TF	OCEAN	—	135(132)	39	—	—	—
008	TF	GRUPA	—	135(132)	86.0	—	—	—

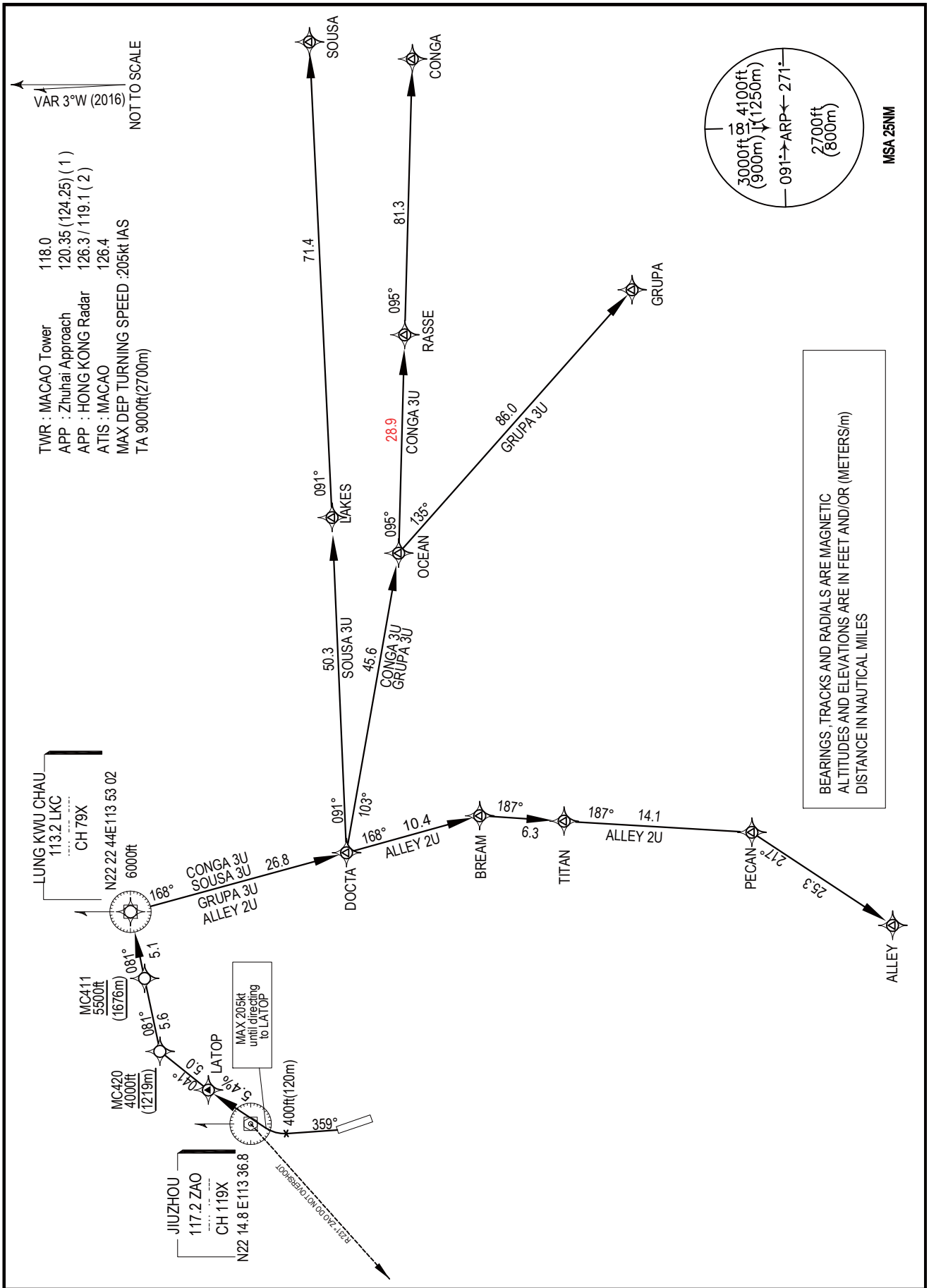
SOUSA 3 T

Sequence Number	Path Terminator	Waypoint	Fly-over	Track °M (°T)	Distance (NM)	Turn Dir	Altitude (ft)	Speed (knot)
001	CA	—	—	359 (356)	—	R	400ft	-205
002	DF	LATOP	—	—	—	R	—	-205
003	TF	MC420	—	041(038)	5.0	—	+4000	—
004	TF	MC411	—	081(078)	5.6	—	+5500	—
005	TF	LKC	—	081(078)	5.1	—	6000	—
006	TF	TD	—	112(109)	24	—	—	—
007	TF	SHELY	—	118(115)	22.2	—	—	—
008	TF	LAKES	—	118(115)	15.8	—	—	—
009	TF	SOUSA	—	091(088)	71.4	—	—	—

Waypoint Coordinates

Waypoint Name	Coordinates (WGS84)	
LATOP	22°16.9′N	113°38.6′E
MC420	22°20′32.29″N	113°41′43.59″E
MC411	22°21′41.20″N	113°47′37.58″E
LKC	22°22′44″N	113°53′02″E
TD	22°14′52.42″N	114°17′35.30″E
SHELY	22°05′26.65″N	114°39′13.94″E
LAKES	21°58′41.3″N	114°54′38.6″E
SOUSA	22°01′10.4″N	116°11′27.8″E
OCEAN	21°48′43.0″N	114°48′48.0″E
RASSE	21°47′34.5″N	115°19′49.1″E
CONGA	21°44′02.5″N	116°47′05.9″E
GRUPA	20°50′44.0″N	115°56′59.0″E
CAMRI	22°01′46.2″N	114°04′28.7″E
BREAM	21°46′46.00″N	114°03′28.00″E
TITAN	21°40′27.4″N	114°03′02.5″E
PECAN	21°26′20.2″N	114°02′05.6″E
ALLEY	21°05′11.2″N	113°47′09.5″E

GUANG ZHOU FIR - HONG KONG FIR
RNAV(GNSS) SID MACAO RWY 34
(ALLEY 2 U, CONGA 3 U, GRUPA 3 U, SOUSA 3 U)
CAT A, B, C, D



The procedure applied to BASIC RNP1,GNSS required.

Corrections: distance OCEAN to RASSE

ALLEY 2 U (minimum climb gradient of 5.4% required until leaving 5500 ft)
Climb on track 359°M, at 400 ft (120 m) turn right. Direct to LATOP, turn right to MC420 at or above 4000 ft (1219m), to MC411 at or above 5500 ft (1676m), to LKC at 6000 ft. Further climb when instructed by ATC. To DOCTA, BREAM, TITAN, PECAN and ALLEY. Continue on Terminal Transition Routes published on Hong Kong AIP.

CONGA 3 U (minimum climb gradient of 5.4% required until leaving 5500 ft)
Climb on track 359°M, at 400 ft (120 m) turn right. Direct to LATOP, turn right to MC420 at or above 4000 ft (1219m), to MC411 at or above 5500 ft (1676m), to LKC at 6000 ft. Further climb when instructed by ATC. To DOCTA, OCEAN, RASSE and CONGA. Continue on Terminal Transition Routes published on Hong Kong AIP.

GRUPA 3 U (minimum climb gradient of 5.4% required until leaving 5500 ft)
Climb on track 359°M, at 400 ft (120 m) turn right. Direct to LATOP, turn right to MC420 at or above 4000 ft (1219m), to MC411 at or above 5500 ft (1676m), to LKC at 6000 ft. Further climb when instructed by ATC. To DOCTA, OCEAN and GRUPA. Continue on Terminal Transition Routes published in Hong Kong AIP.

SOUSA 3 U (minimum climb gradient of 5.4% required until leaving 5500 ft)
Climb on track 359°M, at 400 ft (120 m) turn right. Direct to LATOP, turn right to MC420 at or above 4000 ft (1219m), to MC411 at or above 5500 ft (1676m), to LKC at 6000 ft. Further climb when instructed by ATC. To DOCTA, LAKES and SOUSA. Continue on Terminal Transition Routes published in Hong Kong AIP.

REMARK:
(1) For RNAV(GNSS) SID aircraft must be approved by State of Registry in accordance with ICAO RNP1 standard or equivalent. Carriage of certified GNSS receiver is mandatory.
(2) Aircraft that do not have approval or whose RNP1/ P-RNAV capability has been degraded before departure shall use the Conventional Departure Procedure:

*Depart on track 359°M and climb to 400 ft (120 m). Then turn right and continue climb to ZAO. Leave ZAO on R041° climbing to 4000 ft, at LKC DME 11.5 (MCU DME 12.5) turn right to establish on LKC **R261°**, continue climbing to pass 5500 ft by LKC DME 5.0 and reach 6000 ft by LKC. Further climb when instructed by ATC. From LKC expect radar vectors to **ALLEY, CONGA, GRUPA** or **SOUSA.***

*If ZAO is unserviceable, depart on track 359°M, at MCU DME 3.3 turn right on track 041°M. Then turn right by MCU DME 13.1(LKC DME 11.4) at altitude 4000ft to intercept LKC **R261°**. Continue climbing to pass 5500ft by LKC DME 5.0 and reach 6000ft by LKC. From LKC expect radar vectors to **ALLEY, CONGA, GRUPA** or **SOUSA.***

If LKC is not available, request ALLEY 1 W, CONGA 2 W, GRUPA 2 W, SOUSA 2 W.

(3) Aircraft are NOT TO OVERSHOOT ZAO DVOR R231° which defines the northern limit for flights taking off RWY 34 due to NOISE ABATEMENT for Zhuhai City.
(4) Procedure Design Gradient based only on airspace restriction.
(5) Aircraft unable to comply with the minimum climb gradient must inform MACAO ground control at first contact to allow special coordination.
(6) Maximum departure turning speed: 205 kt IAS until directing to LATOP.
(7) Aircraft shall fly at 250 kt or less below FL 110 transiting Hong Kong Airspace
(8) In the event of loss of communication, aircraft shall comply with the last acknowledged clearance up to the next reporting point in the SID, then climb to the flight planned cruising level and follow the flight planned route to join the appropriate airway.
(9) Owing to the proximity of the Hong Kong International Airport, pilots departing on RWY 34 towards Hong Kong direction are reminded the need to follow the standard SID track until LKC. Any deviation from the standard SID track could result in direct conflict with Hong Kong traffic.

FMC Database Coding Reference for RNAV(GNSS) SIDs

ALLEY 2 U

Sequence Number	Path Terminator	Waypoint	Fly-over	Track °M (°T)	Distance (NM)	Turn Dir	Altitude (ft)	Speed (knot)
001	CA	—	—	359 (356)	—	R	400	-205
002	DF	LATOP	—	—	—	R	—	-205
003	TF	MC420	—	041 (038)	5.0	—	+4000	—
004	TF	MC411	—	081 (078)	5.6	—	+5500	—
005	TF	LKC	—	081 (078)	5.1	—	6000	—
006	TF	DOCTA	—	168 (165)	26.8	—	—	—
007	TF	BREAM	—	168 (165)	10.4	—	—	—
008	TF	TITAN	—	187 (184)	6.3	—	—	—
009	TF	PECAN	—	187 (184)	14.1	—	—	—
010	TF	ALLEY	—	217 (214)	25.3	—	—	—

CONGA 3U (RWY34 SID)

Sequence Number	Path Terminator	Waypoint	Fly-over	Track °M (°T)	Distance (NM)	Turn Dir	Altitude (ft)	Speed (knot)
001	CA	—	—	359(356)	—	R	400	-205
002	DF	LATOP	—	—	—	R	—	-205
003	TF	MC420	—	041(038)	5.0	—	+4000	—
004	TF	MC411	—	081(078)	5.6	—	+5500	—
005	TF	LKC	—	081(078)	5.1	—	6000	—
006	TF	DOCTA	—	168(165)	26.8	—	—	—
007	TF	OCEAN	—	103(100)	45.6	—	—	—
008	TF	RASSE	—	095(092)	28.9	—	—	—
009	TF	CONGA	—	095(092)	81.3	—	—	—

GRUPA 3U (RWY34 SID)

Sequence Number	Path Terminator	Waypoint	Fly-over	Track ° M (°T)	Distance (NM)	Turn Dir	Altitude (ft)	Speed (knot)
001	CA	—	—	359(356)	—	R	400	-205
002	DF	LATOP	—	—	—	R	—	-205
003	TF	MC420	—	041(038)	5.0	—	+4000	—
004	TF	MC411	—	081(078)	5.6	R	+5500	—
005	TF	LKC	—	081(078)	5.1	—	6000	—
006	TF	DOCTA	—	168(165)	26.8	—	—	—
007	TF	OCEAN	—	103(100)	45.6	—	—	—
008	TF	GRUPA	—	135(132)	86.0	—	—	—

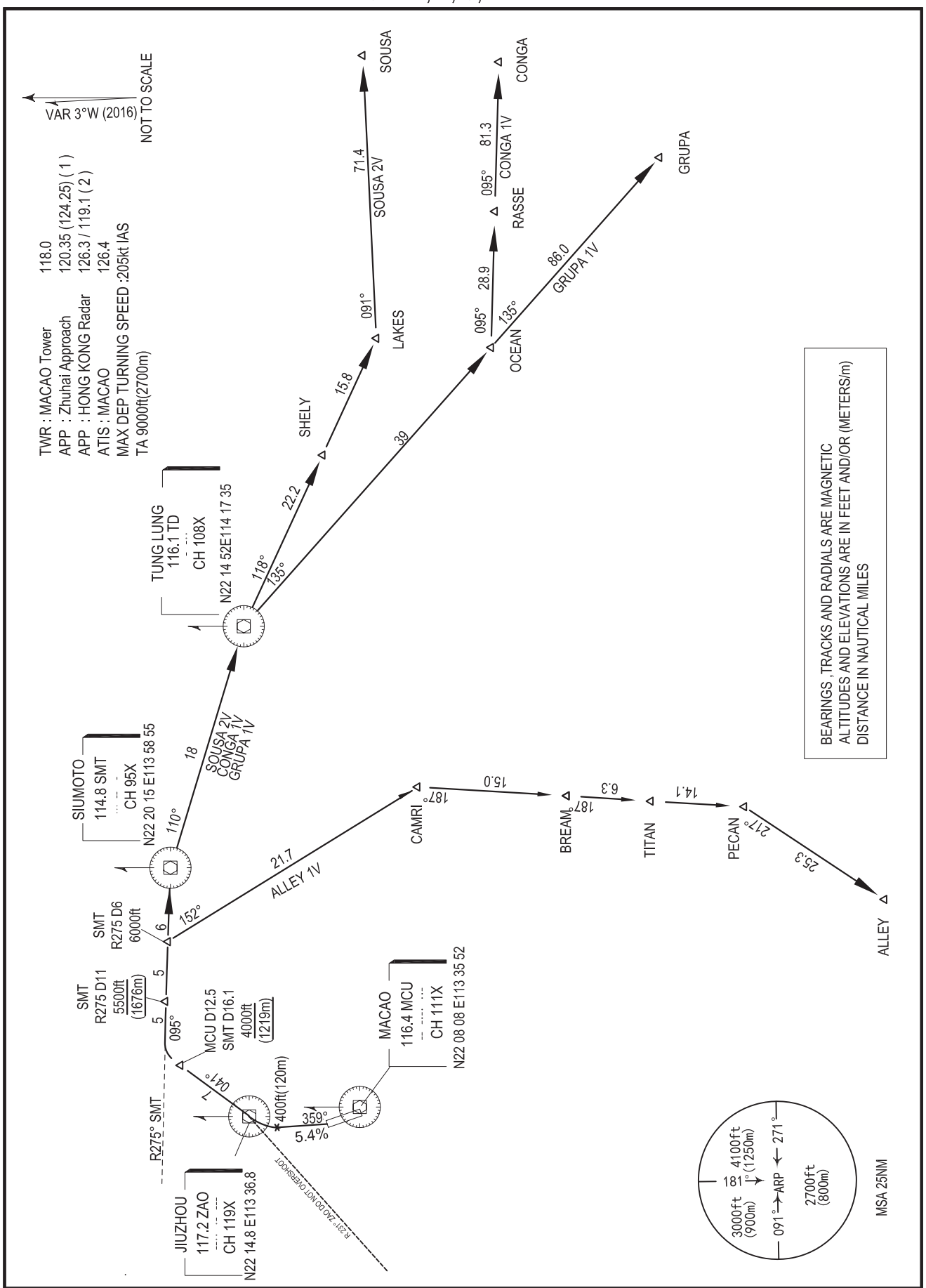
SOUSA 3U (RWY34 SID)

Sequence Number	Path Terminator	Waypoint	Fly-over	Track °M (°T)	Distance (NM)	Turn Dir	Altitude (ft)	Speed (knot)
001	CA	—	—	359 (356)	—	R	400	-205
002	DF	LATOP	—	—	—	R	—	-205
003	TF	MC420	—	041 (038)	5.0	—	+4000	—
004	TF	MC411	—	081 (078)	5.6	—	+5500	—
005	TF	LKC	—	081 (078)	5.1	—	6000	—
006	TF	DOCTA	—	168 (165)	26.8	—	—	—
007	TF	LAKES	—	091 (088)	50.3	—	—	—
008	TF	SOUSA	—	091 (088)	71.4	—	—	—

Waypoint Coordinates

Waypoint Name	Coordinates (WGS84)	
LATOP	22°16.9′N	113°38.6′E
MC420	22°20′32.29″N	113°41′43.59″E
MC411	22°21′41.20″N	113°47′37.58″E
LKC	22°22′44″N	113°53′02″E
DOCTA	21°56′49.5″N	114°00′33.4″E
LAKES	21°58′41.3″N	114°54′38.6″E
SOUSA	22°01′10.4″N	116°11′27.8″E
OCEAN	21°48′43.0″N	114°48′48.0″E
RASSE	21°47′34.5″N	115°19′49.1″E
CONGA	21°44′02.5″N	116°47′05.9″E
GRUPA	20°50′44.0″N	115°56′59.0″E
BREAM	21°46′46.00″N	114°03′28.00″E
TITAN	21°40′27.4″N	114°03′02.5″E
PECAN	21°26′20.2″N	114°02′05.6″E
ALLEY	21°05′11.2″N	113°47′09.5″E

GUANG ZHOU FIR - HONG KONG FIR
SID MACAO RWY 34
(ALLEY 1 V, CONGA 1 V, GRUPA 1 V, SOUSA 2 V)
CAT A, B, C, D



RADIO FAILURE PROCEDURE : Squawk A / 7600

ALLEY 1 V (minimum climb gradient of 5.4% required until leaving 5500 ft)
Depart on track 359°M and climb to 400 ft (120 m). Then turn right and continue climb to ZAO. Leave ZAO on R041° climbing to 4000 ft, at SMT DME 16.1 (MCU DME 12.5) turn right to establish on SMT R275°, continue climbing to pass 5500 ft by SMT DME 11.0 and reach 6000 ft by SMT DME 6.0. Further climb when instructed by ATC. From SMT DME 6.0 turn right to CAMRI. From CAMRI turn right direct to BREAM, then TITAN and then PECAN. From PECAN turn right to ALLEY. Continue on Terminal Transition Routes published in Hong Kong AIP.

If SMT is not available, ALLEY 1 V is not permitted.

CONGA 1 V (minimum climb gradient of 5.4% required until leaving 5500 ft)
Depart on track 359°M and climb to 400 ft (120 m). Then turn right and continue climb to ZAO. Leave ZAO on R041° climbing to 4000 ft, at SMT DME 16.1 (MCU DME 12.5) turn right to establish on SMT R275°, continue climbing to pass 5500 ft by SMT DME 11.0 and reach 6000 ft by SMT DME 6.0. Further climb when instructed by ATC. From SMT track direct to TD. From TD track direct to OCEAN and then turn left direct to RASSE and CONGA. Continue on Terminal Transition Routes published in Hong Kong AIP.

If SMT is not available, CONGA 1 V is not permitted.
If TD is not available, expect radar vectors to CONGA.

GRUPA 1 V (minimum climb gradient of 5.4% required until leaving 5500 ft)
Depart on track 359°M and climb to 400 ft (120 m). Then turn right and continue climb to ZAO. Leave ZAO on R041° climbing to 4000 ft, at SMT DME 16.1 (MCU DME 12.5) turn right to establish on SMT R275°, continue climbing to pass 5500 ft by SMT DME 11.0 and reach 6000 ft by SMT DME 6.0. Further climb when instructed by ATC. From SMT track direct to TD. From TD track direct to OCEAN and then GRUPA. Continue on Terminal Transition Routes published in Hong Kong AIP.

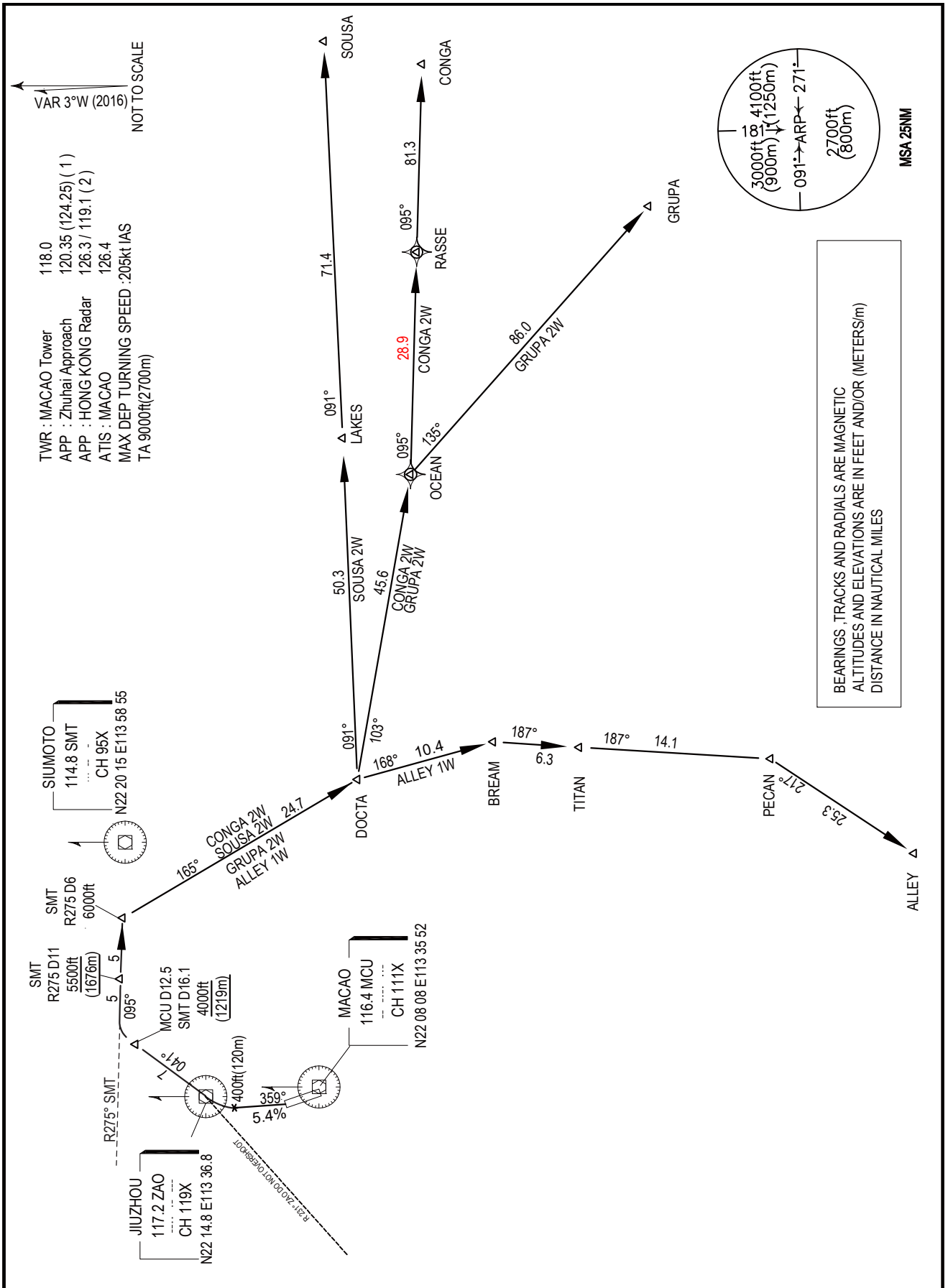
If SMT is not available, GRUPA 1 V is not permitted
If TD is not available, expect radar vectors to GRUPA.

SOUSA 2 V (minimum climb gradient of 5.4% required until leaving 5500 ft)
Depart on track 359°M and climb to 400 ft (120 m). Then turn right and continue climb to ZAO. Leave ZAO on R041° climbing to 4000 ft, at SMT DME 16.1 (MCU DME 12.5) turn right to establish on SMT R275°, continue climbing to pass 5500 ft by SMT DME 11.0 and reach 6000 ft by SMT DME 6.0. Further climb when instructed by ATC. From SMT track direct to TD. From TD turn right direct to SHELY then LAKES. From LAKES turn left direct to SOUSA. Continue on Terminal Transition Routes published in Hong Kong AIP.

If SMT is not available, SOUSA 2 V is not permitted.
If TD is not available, expect radar vectors to SHELY.

REMARK:
(1) Aircraft are NOT TO OVERSHOOT JIUZHOU DVOR (ZAO 117.2 MHz) R231° which defines the northern limit for flights taking off RWY 34 due to NOISE ABATEMENT for Zhuhai City.
(2) Procedure Design Gradient based only on airspace restriction.
(3) Aircraft unable to comply with the minimum climb gradient must inform MACAO ground control at first contact to allow special coordination.
(4) Maximum departure turning speed: 205 kt IAS until ZAO DVOR.
(5) Standard Instrument Departure Procedures (SIDs) transiting Hong Kong Airspace
Speed Restriction
Aircraft shall fly at 250 kt or less below FL 110.
Loss of communication
In the event of loss of communication, aircraft shall comply with the last acknowledged clearance up to the next reporting point in the SID, then climb to the flight planned cruising level and follow the flight planned route to join the appropriate airway.
(6) Owing to the proximity of the Hong Kong international airport, pilots departing on RWY 34 towards Hong Kong direction are reminded the need to follow the standard SID track until LKC DVOR. Any deviation from the standard SID track could result in direct conflict with Hong Kong traffic.
(7) If ZAO is unserviceable, Depart on track 359°M, at MCU DME 3.3NM turn right on track 041°M. Then turn right by MCU DME 13.8NM (SMT DME 16.2NM) at altitude 4000ft to intercept SMT R275°, continue climbing to pass 5500ft by SMT DME 11.0NM and reach 6000ft by SMT DME 6.0NM. Further climb when instructed by ATC and continues the original SID.

GUANG ZHOU FIR - HONG KONG FIR
SID MACAO RWY 34
(ALLEY 1 W, CONGA 2 W, GRUPA 2 W, SOUSA 2 W)
CAT A, B, C, D



RADIO FAILURE PROCEDURE : Squawk A / 7600

Corrections: distance OCEAN to RASSE.

ALLEY 1 W (minimum climb gradient of 5.4% required until leaving 5500 ft)
Depart on track 359°M and climb to 400 ft (120 m). Then turn right and continue climb to ZAO. Leave ZAO on R041° climbing to 4000 ft, at SMT DME 16.1 (MCU DME 12.5) turn right to establish on SMT R275°, continue climbing to pass 5500 ft by SMT DME 11.0 and reach 6000 ft by SMT DME 6.0. Further climb when instructed by ATC. From SMT DME 6.0 turn right to DOCTA and then BREAM. From BREAM turn right direct to TITAN and then PECAN. From PECAN turn right to ALLEY. Continue on Terminal Transition Routes published on Hong Kong AIP.

If SMT is not available, ALLEY 1 W is not permitted.

CONGA 2 W (minimum climb gradient of 5.4% required until leaving 5500 ft)
Depart on track 359°M and climb to 400 ft (120 m). Then turn right and continue climb to ZAO. Leave ZAO on R041° climbing to 4000 ft, at SMT DME 16.1 (MCU DME 12.5) turn right to establish on SMT R275°, continue climbing to pass 5500 ft by SMT DME 11.0 and reach 6000 ft by SMT DME 6.0. Further climb when instructed by ATC. At SMT DME 6.0 turn right direct to DOCTA. Expect to cross DOCTA FL140 or above. From DOCTA turn left direct to OCEAN then turn left direct to RASSE and CONGA. Continue on Terminal Transition Routes published in Hong Kong AIP.

If SMT is not available, CONGA 2 W is not permitted.

GRUPA 2 W (minimum climb gradient of 5.4% required until leaving 5500 ft)
Depart on track 359°M and climb to 400 ft (120 m). Then turn right and continue climb to ZAO. Leave ZAO on R041° climbing to 4000 ft, at SMT DME 16.1 (MCU DME 12.5) turn right to establish on SMT R275°, continue climbing to pass 5500 ft by SMT DME 11.0 and reach 6000 ft by SMT DME 6.0. Further climb when instructed by ATC. At SMT DME 6.0 turn right direct to DOCTA. Expect to cross DOCTA FL140 or above. From DOCTA turn left direct to OCEAN then turn right direct to GRUPA. Continue on Terminal Transition Routes published in Hong Kong AIP.

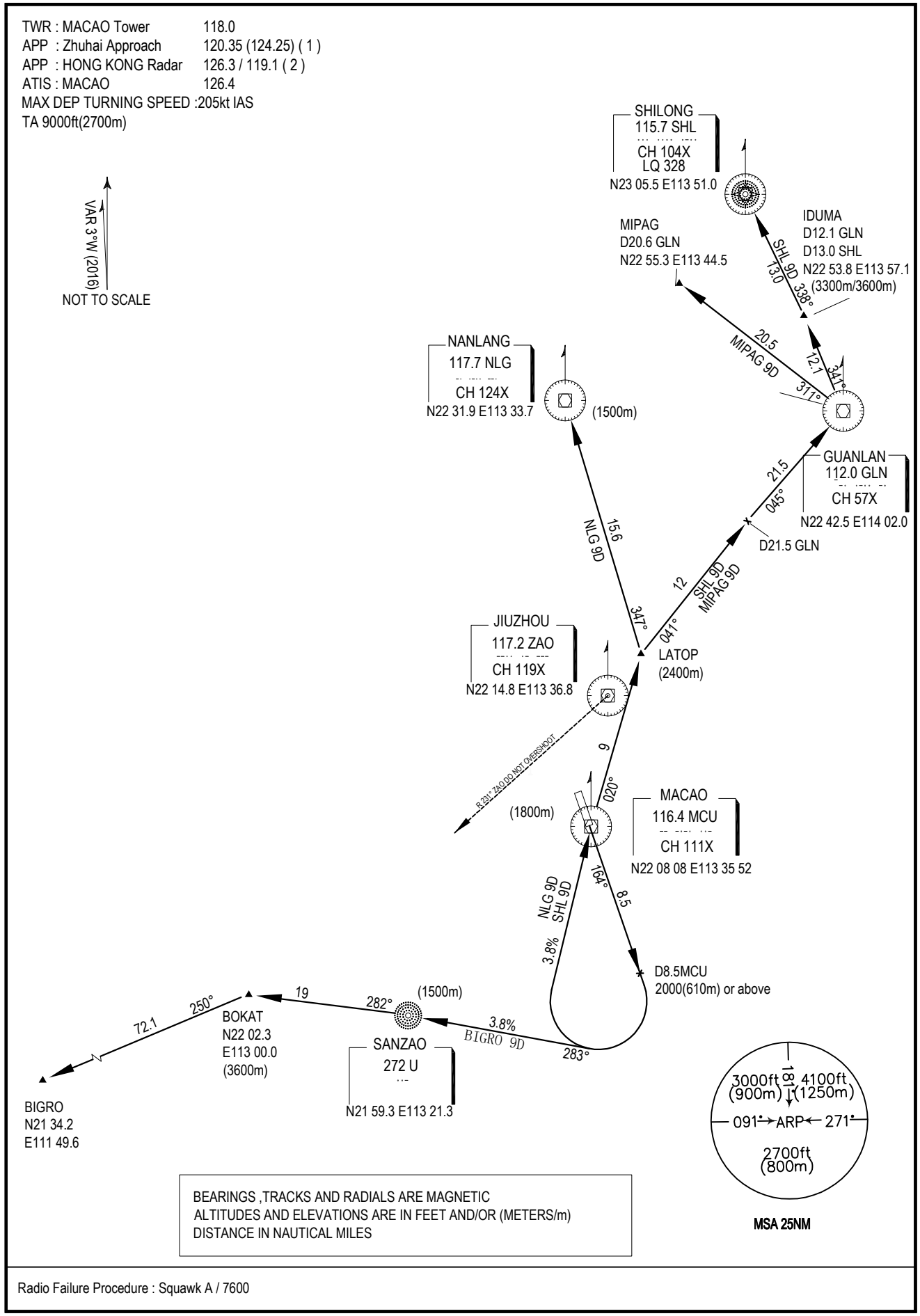
If SMT is not available, GRUPA 2 W is not permitted.

SOUSA 2 W (minimum climb gradient of 5.4% required until leaving 5500 ft)
Depart on track 359°M and climb to 400 ft (120 m). Then turn right and continue climb to ZAO. Leave ZAO on R041° climbing to 4000 ft, at SMT DME 16.1 (MCU DME 12.5) turn right to establish on SMT R275°, continue climbing to pass 5500 ft by SMT DME 11.0 and reach 6000 ft by SMT DME 6.0. Further climb when instructed by ATC. At SMT DME 6.0 turn right direct to DOCTA. Expect to cross DOCTA FL140 or above. From DOCTA turn left direct to LAKES and SOUSA. Continue on Terminal Transition Routes published in Hong Kong AIP.

If SMT is not available, SOUSA 2 W is not permitted.

REMARK:
(1) Aircraft are NOT TO OVERSHOOT JIUZHOU DVOR (ZAO 117.2 MHz) R231° which defines the northern limit for flights taking off RWY 34 due to NOISE ABATEMENT for Zhuhai City.
(2) Procedure Design Gradient based only on airspace restriction.
(3) Aircraft unable to comply with the minimum climb gradient must inform MACAO ground control at first contact to allow special coordination.
(4) Maximum departure turning speed: 205 kt IAS until ZAO DVOR.
(5) Standard Instrument Departure Procedures (SIDs) transiting Hong Kong Airspace
Speed Restriction
Aircraft shall fly at 250 kt or less below FL 110.
Loss of communication
In the event of loss of communication, aircraft shall comply with the last acknowledged clearance up to the next reporting point in the SID, then climb to the flight planned cruising level and follow the flight planned route to join the appropriate airway.
(6) Owing to the proximity of the Hong Kong international airport, pilots departing on RWY 34 towards Hong Kong direction are reminded the need to follow the standard SID track until LKC DVOR. Any deviation from the standard SID track could result in direct conflict with Hong Kong traffic.
(7) If ZAO is unserviceable, Depart on track 359°M, at MCU DME 3.3NM turn right on track 041°M. Then turn right by MCU DME 13.8NM (SMT DME 16.2NM) at altitude 4000ft to intercept SMT R275°, continue climbing to pass 5500ft by SMT DME 11.0NM and reach 6000ft by SMT DME 6.0NM. Further climb when instructed by ATC and continues the original SID.

GUANG ZHOU FIR - HONG KONG FIR
SID MACAO RWY 16
(BIGRO 9 D, MIPAG 9 D, NLG 9 D, SHL 9 D)
CAT A, B, C, D



BIGRO 9 D (minimum climb gradient of 3.8% required until leaving 1500 m)
Climb straight ahead to cross MCU DME 8.5 at 2000 ft (610 m) or above, then turn right on track 283°M, continue climbing and pass Sanzao beacon (U 272 kHz) at 1500 m. Climb on track 282°M to BOKAT at 3600 m, turn left on heading 250°M to BIGRO.

If MCU is unserviceable, BIGRO 9 D is not permitted, request BIGRO 1 D SID.

MIPAG 9 D (minimum climb gradient of 3.8% required until leaving 2400 m)
Climb straight ahead to cross MCU DME 8.5 at 2000 ft (610 m) or above, then turn right to MCU via MCU R197° and cross MCU at 1800 m. Leave MCU on R020° and continue climbing to 2400 m, at LATOP turn right to establish on ZAO R041°. Continue climbing on ZAO R041° to 3300 m and maintain. At GLN DME 21.5 proceed on GLN R225° to GLN, turn left on GLN R311° to MIPAG.

If MCU is unserviceable, MIPAG 9 D is not permitted, request MIPAG 1 D SID.

NLG 9 D (minimum climb gradient of 3.8% required until reaching 2400 m)
Climb straight ahead to cross MCU DME 8.5 at 2000 ft (610 m) or above, then turn right to MCU via MCU R197° and cross MCU at 1800 m. Leave MCU on R020° and reach 2400 m by LATOP. At LATOP turn left to establish NLG R167 ° and descend to reach 1500m by NLG.

If MCU is unserviceable, NLG 9 D is not permitted, request NLG 1 D SID.

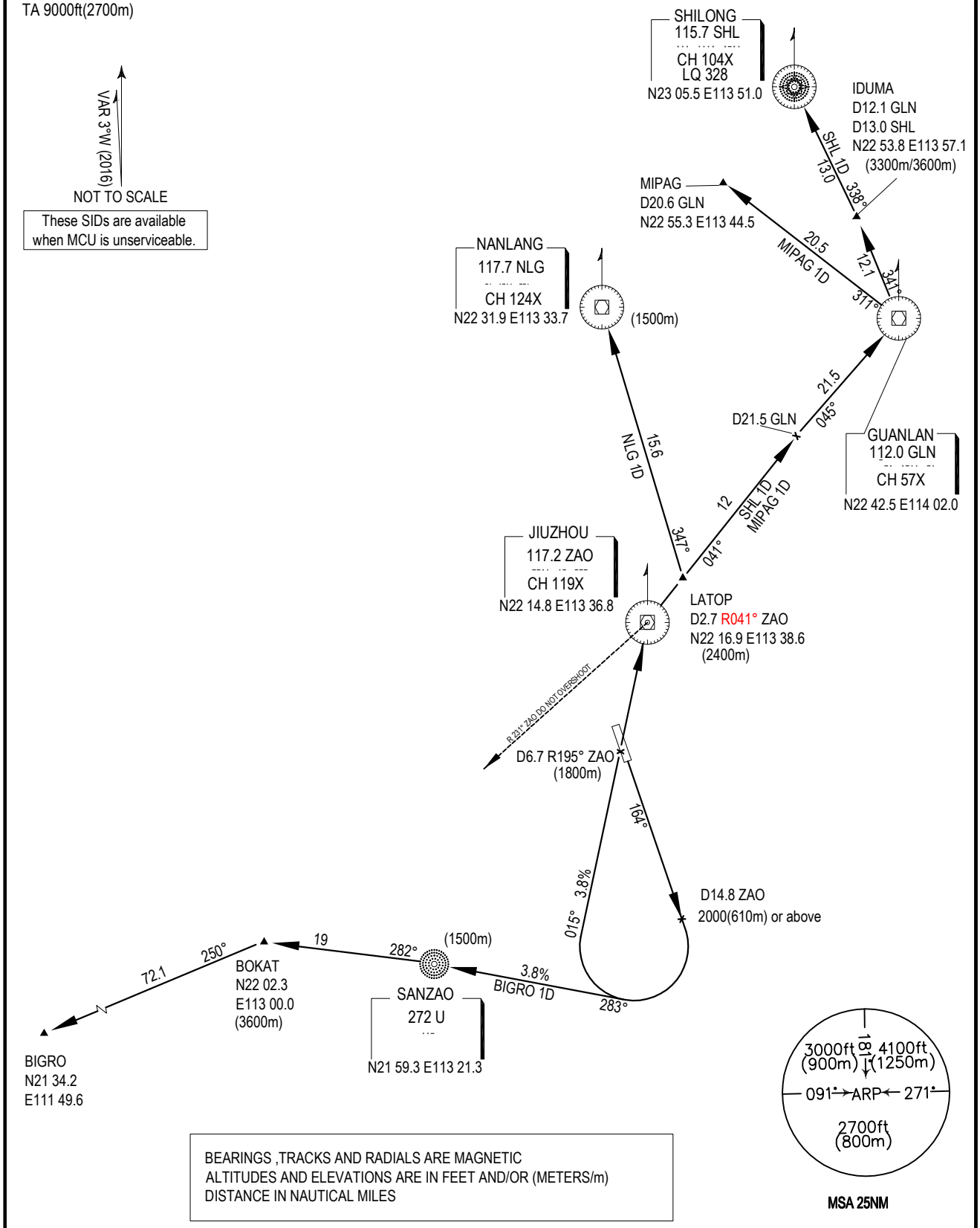
SHL 9 D (minimum climb gradient of 3.8% required until leaving 2400 m)
Climb straight ahead to cross MCU DME 8.5 at 2000 ft (610 m) or above, then turn right to MCU via MCU R197° and cross MCU at 1800 m. Leave MCU on R020° and continue climbing to 2400 m, at LATOP turn right to establish on ZAO R041°. Continue climbing on ZAO R041° to 3300 m and maintain. At GLN DME 21.5 proceed on GLN R225° and pass GLN. Leave GLN on R341° to IDUMA at 3300 m/3600 m. Turn left at IDUMA and proceed to SHL via SHL R158°.

If MCU is unserviceable, SHL 9 D is not permitted, request SHL 1 D SID.

REMARK:
(1) Aircraft unable to comply with the minimum climb gradient must inform MACAO ground control at first contact to allow special coordination.
(2) Maximum departure turning speed: 205 kt IAS.

GUANG ZHOU FIR - HONG KONG FIR
SID MACAO RWY 16
(BIGRO 1 D, MIPAG 1 D, NLG 1 D, SHL 1 D)
CAT A, B, C, D

TWR : MACAO Tower 118.0
APP : Zhuhai Approach 120.35 (124.25) (1)
APP : HONG KONG Radar 126.3 / 119.1 (2)
ATIS : MACAO 126.4
MAX DEP TURNING SPEED :205kt IAS
TA 9000ft(2700m)



BEARINGS ,TRACKS AND RADIALS ARE MAGNETIC
ALTITUDES AND ELEVATIONS ARE IN FEET AND/OR (METERS/m)
DISTANCE IN NAUTICAL MILES

Radio Failure Procedure : Squawk A / 7600

BIGRO 1 D (minimum climb gradient of 3.8% required until leaving 1500 m)
Climb straight ahead to 1500 m and cross ZAO DME 14.8 NM at 2000 ft (610 m) or above then turn right on track 283°M, continue climbing and pass Sanzao beacon (U 272 kHz) at 1500 m. Climb on track 282°M to BOKAT at 3600 m, turn left on heading 250°M to BIGRO.

MIPAG 1 D (minimum climb gradient of 3.8% required until leaving 2400 m)
Climb straight ahead to 1800 m and cross ZAO DME 14.8 NM at 2000 ft (610 m) or above then turn right to ZAO via ZAO R195° and cross ZAO DME 6.7 NM at 1800 m, leave ZAO on R041° and cross 2400 m by LATOP. Continue climbing on ZAO R041° to 3300 m/3600 m and maintain. At GLN DME 21.5 proceed on GLN R225° to GLN, turn left on GLN R311° to MIPAG.

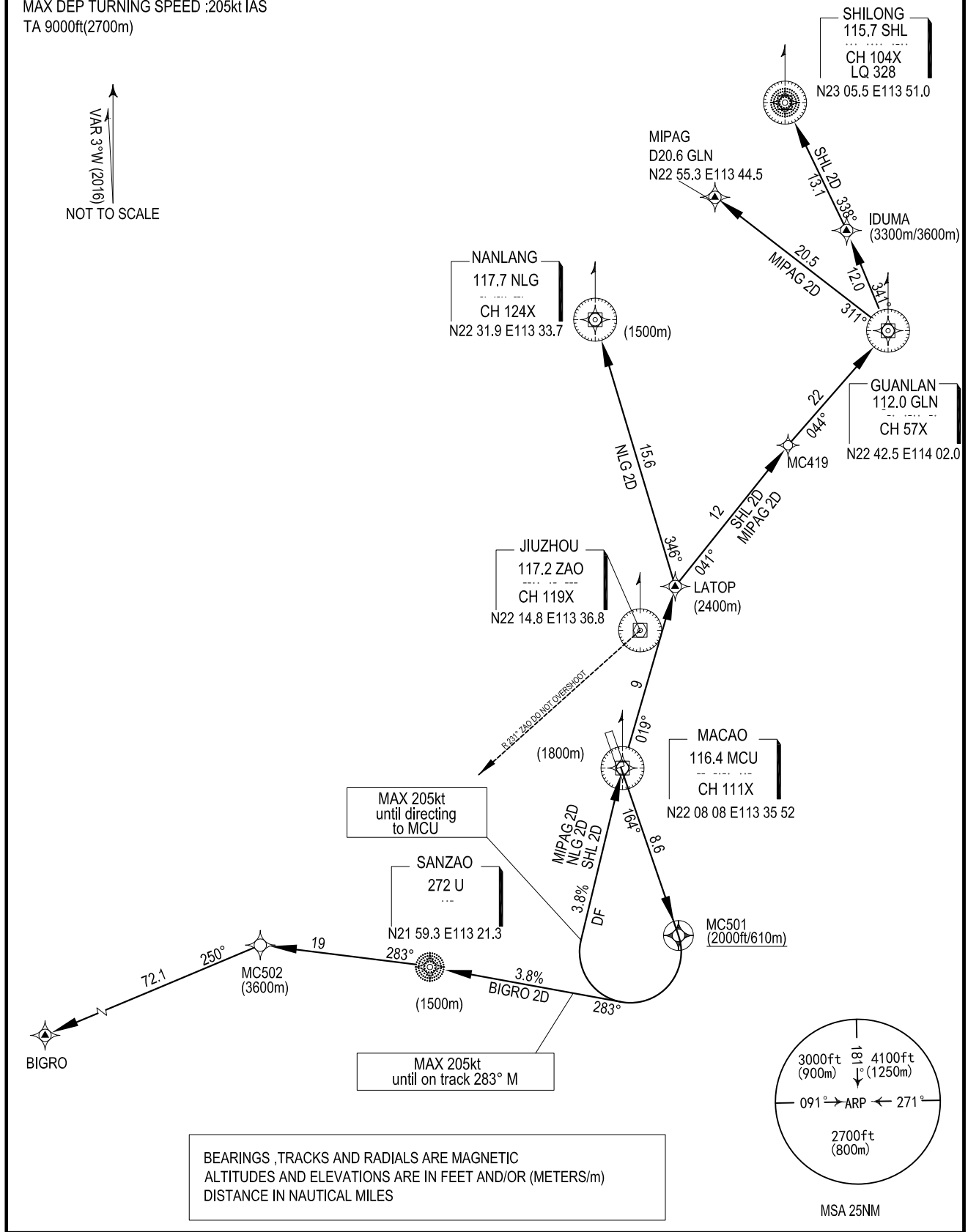
NLG 1 D (minimum climb gradient of 3.8% required until reaching 2400 m)
Climb straight ahead to 1800 m and cross ZAO DME 14.8 NM at 2000 ft (610 m) or above then turn right to ZAO via ZAO R195° and cross ZAO DME 6.7 NM at 1800 m, leave ZAO on R041° and reach 2400 m by LATOP. At LATOP turn left to establish NLG R167° and descend to reach 1500m by NLG.

SHL 1 D (minimum climb gradient of 3.8% required until leaving 2400 m)
Climb straight ahead to 1800 m and cross ZAO DME 14.8 NM at 2000 ft (610 m) or above then turn right to ZAO via ZAO R195° and cross ZAO DME 6.7 NM at 1800 m, leave ZAO on R041° and cross 2400 m by LATOP. Continue climbing on ZAO R041° to 3300 m and maintain. At GLN DME 21.5 proceed on GLN R225° and pass GLN. Leave GLN on R341° to IDUMA at 3300 m. Turn left at IDUMA and proceed to SHL via SHL R158°.

REMARK:
(1) These SIDs are available when MCU is unserviceable.
(2) Aircraft unable to comply with the minimum climb gradient must inform MACAO ground control at first contact to allow special coordinations.
(3) Maximum departure truning speed: 205 kt IAS.

GUANG ZHOU FIR - HONG KONG FIR
RNAV(GNSS) SID MACAO RWY 16
(BIGRO 2 D, MIPAG 2 D, NLG 2 D, SHL 2 D)
CAT A, B, C, D

TWR : MACAO Tower 118.0
APP : Zhuhai Approach 120.35 (124.25) (1)
APP : HONG KONG Radar 126.3 / 119.1 (2)
ATIS : MACAO 126.4
MAX DEP TURNING SPEED :205kt IAS
TA 9000ft(2700m)



BEARINGS ,TRACKS AND RADIALS ARE MAGNETIC
ALTITUDES AND ELEVATIONS ARE IN FEET AND/OR (METERS/m)
DISTANCE IN NAUTICAL MILES

The procedure applied to BASIC RNP1,GNSS required.

BIGRO 2 D (minimum climb gradient of 3.8% required until leaving 1500 m)
Depart and Climb to fly-over MC501 on course 164°M at 2000 ft (610 m) or above, then turn right to Sanzao beacon (U 272 kHz) at 1500 m on course 283°M. To MC502 at 3600 m and BIGRO.

MIPAG 2 D (minimum climb gradient of 3.8% required until leaving 2400 m)
Depart and Climb to fly-over MC501 on course 164°M at 2000 ft (610 m) or above, then turn right direct to MCU at 1800 m. to LATOP at 2400m, to MC419, GLN, MIPAG.

NLG 2 D (minimum climb gradient of 3.8% required until reaching 2400 m)
Depart and Climb to fly-over MC501 on course 164°M at 2000 ft (610 m) or above, then turn right direct to MCU at 1800 m. to LATOP at 2400m, and to NLG at 1500m.

SHL 2 D (minimum climb gradient of 3.8% required until leaving 2400 m)
Depart and Climb to fly-over MC501 on course 164°M at 2000 ft (610 m) or above, then turn right direct to MCU at 1800 m. to LATOP at 2400m, to MC419, GLN, IDUMA at 3300 m and to SHL.

REMARK :
(1) For RNAV(GNSS) SID aircraft must be approved by State of Registry in accordance with ICAO RNP1 standard or equivalent. Carriage of certified GNSS receiver is mandatory.
(2) Aircraft that do not have approval or whose RNP1/ P-RNAV capability has been degraded before departure shall use the Conventional Departure Procedure: BIGRO 9 D, NLG 9 D, SHL 9 D, BIGRO 1 D, NLG 1 D or SHL 1 D.
(3) Aircraft unable to comply with the minimum climb gradient must inform MACAO ground control at first contact to allow special coordinations.
(4) Maximum departure turning speed: 205 kt IAS.

FMC Database Coding Reference for RNAV(GNSS) SIDs

BIGRO 2 D

Sequence Number	Path Terminator	Waypoint	Fly-over	Track °M (°T)	Distance (NM)	Turn Dir	Altitude (ft)	Speed (knot)
001	CF	MC501	Y	164 (161)	8.6	—	+2000	-205
002	CF	U	—	283(280)	—	R	4900	-205
003	TF	MC502	—	283(280)	19	—	11800	-
004	TF	BIGRO	—	250(247)	72.1	—	—	—

MIPAG 2 D

Sequence Number	Path Terminator	Waypoint	Fly-over	Track °M (°T)	Distance (NM)	Turn Dir	Altitude (ft)	Speed (knot)
001	CF	MC501	Y	164 (161)	8.6	—	+2000	-205
002	DF	MCU	—	—	—	R	5900	-205
003	TF	LATOP	—	019(016)	9	—	7900	-
004	TF	MC419	—	041(038)	12	—	—	-
005	TF	GLN	—	044(041)	22	—	—	-
006	TF	MIPAG	—	311(308)	20.5	L	—	—

NLG 2 D

Sequence Number	Path Terminator	Waypoint	Fly-over	Track °M (°T)	Distance (NM)	Turn Dir	Altitude (ft)	Speed (knot)
001	CF	MC501	Y	164 (161)	8.6	—	+2000	-205
002	DF	MCU	—	—	—	R	5900	-205
003	TF	LATOP	—	019(016)	9	—	7900	—
004	TF	NLG	—	346(343)	15.6	—	4900	—

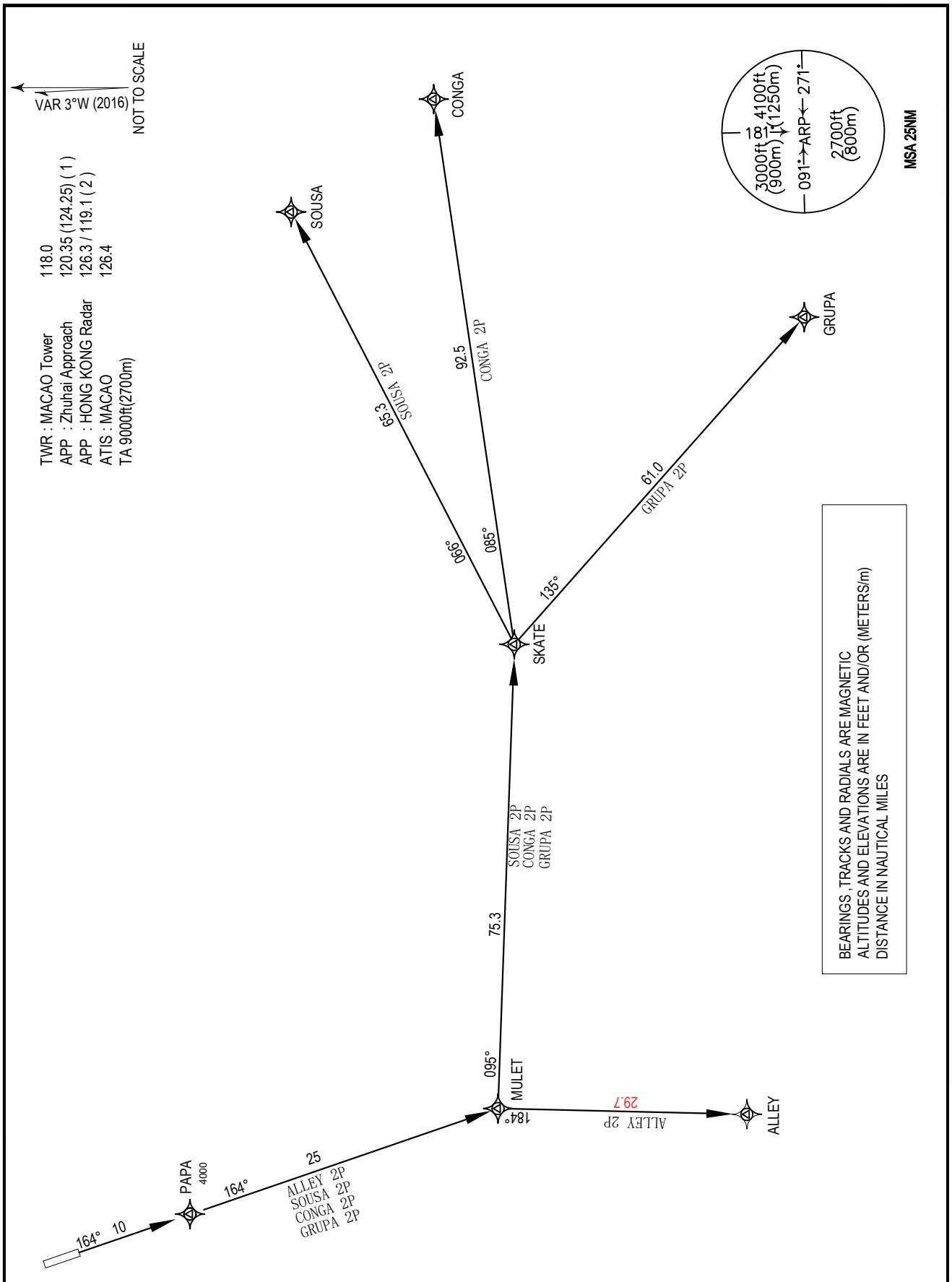
SHL 2 D

Sequence Number	Path Terminator	Waypoint	Fly-over	Track °M (°T)	Distance (NM)	Turn Dir	Altitude (ft)	Speed (knot)
001	CF	MC501	Y	164 (161)	8.6	—	+2000	-205
002	DF	MCU	—	—	—	R	5900	-205
003	TF	LATOP	—	019(016)	9	—	7900	-
004	TF	MC419	—	041(038)	12	—	—	-
005	TF	GLN	—	044(041)	22	—	—	-
006	TF	IDUMA	—	341(338)	12.0	—	10800	—
007	TF	SHL	—	338(335)	13.1	—	—	—

Waypoint Coordinates

Waypoint Name	Coordinates (WGS84)	
MC501	22°00′03.00″N	113°38′45.76″E
U	21°59.3′N	113°21.3′E
MC502	22°02′43.76″N	113°00′50.39″E
BIGRO	21°34.2′N	111°49.6′E
LATOP	22°16.9′N	113°38.6′E
NLG	22°31.9′N	113°33.7′E
MC419	22°26′25.37″N	113°46′47.49″E
GLN	22°42.5′N	114°02.0′E
IDUMA	22°53.8′N	113°57.1′E
SHL	23°05.5′N	113°51.0′E
MIPAG	22°55.3′N	113°44.5′E

GUANG ZHOU FIR - HONG KONG FIR
RNAV(GNSS) SID MACAO RWY 16
(ALLEY 2 P, CONGA 2 P, GRUPA 2 P, SOUSA 2 P)
CAT A, B, C, D



The procedure applied to BASIC RNP1,GNSS required.

ALLEY 2 P
Climb on track 164°M to PAPA at 4000 ft. Expect further climb when instructed by ATC. To MULET and ALLEY. Continue on Terminal Transition route published in Hong Kong AIP.

CONGA 2 P
Climb on track 164°M to PAPA at 4000 ft. Expect further climb when instructed by ATC. To MULET, SKATE and CONGA. Continue on Terminal Transition Routes published in Hong Kong AIP.

GRUPA 2 P
Climb on track 164°M to PAPA at 4000 ft. Expect further climb when instructed by ATC. To MULET, SKATE and GRUPA. Continue on Terminal Transition Routes published in Hong Kong AIP.

SOUSA 2 P
Climb on track 164°M to PAPA at 4000 ft. Expect further climb when instructed by ATC. To MULET, SKATE and SOUSA. Continue on Terminal Transition Routes published in Hong Kong AIP.

REMARK:
(1) For RNAV(GNSS) SID aircraft must be approved by State of Registry in accordance with ICAO RNP1 standard or equivalent. Carriage of certified GNSS receiver is mandatory.
(2) Aircraft that do not have approval or whose RNP1/ P-RNAV capability has been degraded before departure shall use the Conventional Departure Procedure:

Proceed on MCU R164° to PAPA at 4000 ft. Further climb when instructed by ATC. From PAPA expect radar vectors to ***ALLEY, CONGA, GRUPA*** *or* ***SOUSA.***

If MCU is unserviceable, Climb straight ahead to 4000 ft, track direct to MULET and expect radar vectors to ***ALLEY, CONGA, GRUPA*** *or* ***SOUSA.***

(3) Aircraft are NOT TO OVERSHOOT JIUZHOU DVOR (ZAO 117.2 MHz) R231° which defines the northern limit for flights taking off RWY 34 due to NOISE ABATEMENT for Zhuhai City.
(4) Aircraft unable to comply with the minimum climb gradient must inform MACAO ground control at first contact to allow special coordination.
(5) Aircraft shall fly at 250 kt or less below FL 110 transiting Hong Kong Airspace
(6) In the event of loss of communication, aircraft shall comply with the last acknowledged clearance up to the next reporting point in the SID, then climb to the flight planned cruising level and follow the flight planned route to join the appropriate airway.

FMC Database Coding Reference for RNAV(GNSS) SIDs

ALLEY 2 P

Sequence Number	Path Terminator	Waypoint	Fly-over	Track °M (°T)	Distance (NM)	Turn Dir	Altitude (ft)	Speed (knot)
001	CA		—	164 (161)		—	420	—
002	CF	PAPA	—	164 (161)	10.0	—	4000	—
003	TF	MULET	—	164 (161)	26.4	—	—	—
004	TF	ALLEY	—	184 (181)	29.7	—	—	—

SOUSA 2 P (RWY16 SID)

Sequence Number	Path Terminator	Waypoint	Fly-over	Track °M (°T)	Distance (NM)	Turn Dir	Altitude (ft)	Speed (knot)
001	CA		—	164 (161)		—	420	—
002	CF	PAPA	—	164 (161)	10.0	—	4000	—
003	TF	MULET	—	164 (161)	26.4	—	—	—
004	TF	SKATE	—	095 (092)	75.3	—	—	—
005	TF	SOUSA	—	065 (063)	65.3	—	—	—

CONGA 2 P (RWY16 SID)

Sequence Number	Path Terminator	Waypoint	Fly-over	Track °M (°T)	Distance (NM)	Turn Dir	Altitude (ft)	Speed (knot)
001	CA		—	164 (161)		—	420	—
002	CF	PAPA	—	164 (161)	10.0	—	4000	—
003	TF	MULET	—	164(161)	26.4	—	—	—
004	TF	SKATE	—	095(092)	75.3	—	—	—
005	TF	CONGA	—	085(082)	92.5	—	—	—

GRUPA 2 P (RWY16 SID)

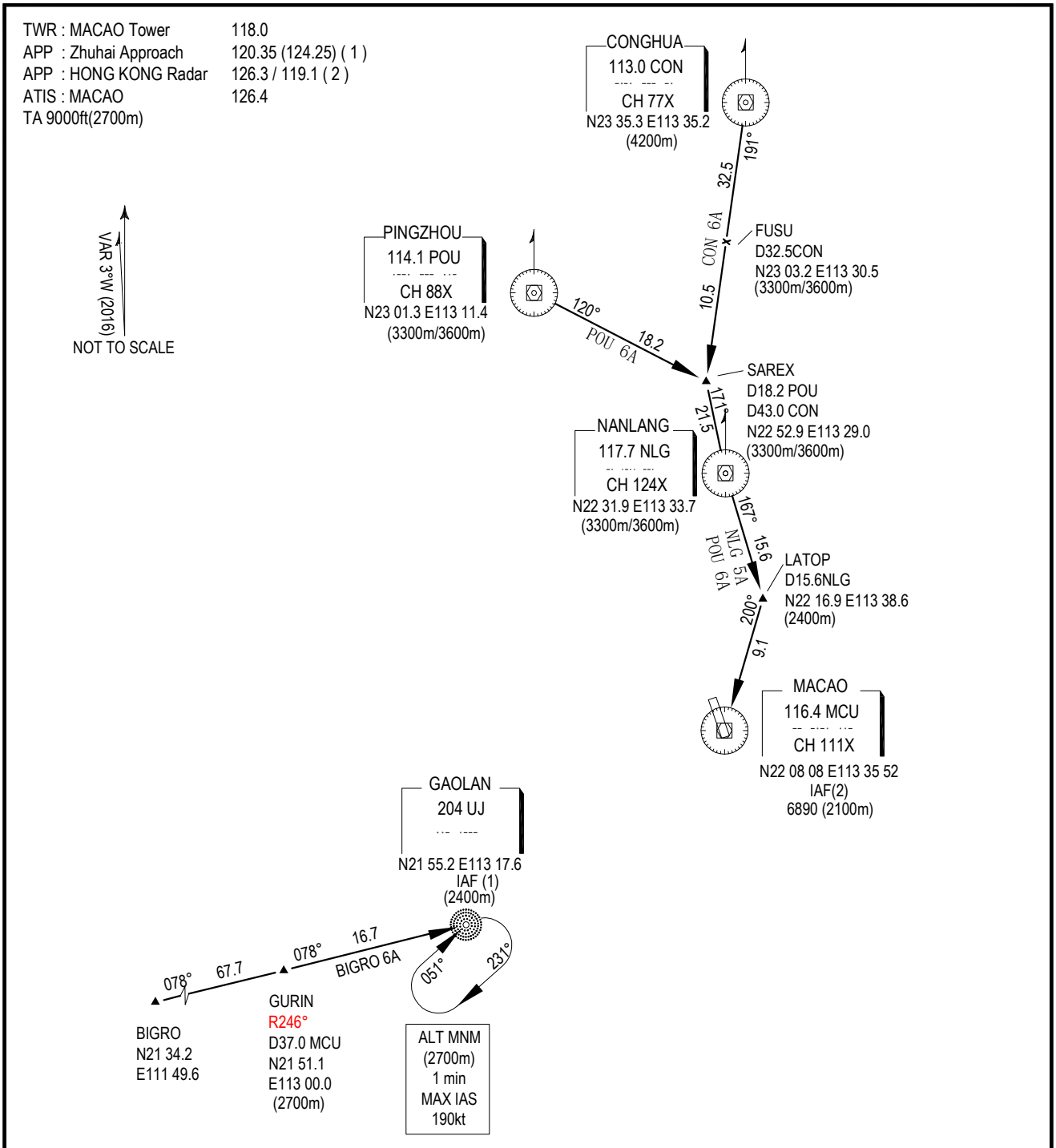
Sequence Number	Path Terminator	Waypoint	Fly-over	Track °M (°T)	Distance (NM)	Turn Dir	Altitude (ft)	Speed (knot)
001	CA		—	164 (161)		—	420	—
002	CF	PAPA	—	164 (161)	10.0	—	4000	—
003	TF	MULET	—	164 (161)	26.4	—	—	—
004	TF	SKATE	—	095 (092)	75.3	—	—	—
005	TF	GRUPA	—	135 (132)	61.0	—	—	—

Waypoint Coordinates

Waypoint Name	Coordinates (WGS84)	
MC501	22°00′03.00″N	113°38′45.76″E
MULET	21°35′02.0″N	113°47′52.0″E
ALLEY	21°05′11.2″	113°47′09.5″E
SKATE	21°31′55.0″N	115°08′40.0″E
SOUSA	22°01′10.4″N	116°11′27.8″E
CONGA	21°44′02.5″N	116°47′05.9″E
GRUPA	20°50′44.0″N	115°56′59.0″E

GUANG ZHOU FIR - HONG KONG FIR
STAR MACAO RWY 34
(BIGRO 6 A, CON 6 A, NLG 5 A, POU 6 A)
CAT A, B, C, D

TWR : MACAO Tower	118.0
APP : Zhuhai Approach	120.35 (124.25) (1)
APP : HONG KONG Radar	126.3 / 119.1 (2)
ATIS : MACAO	126.4
TA 9000ft(2700m)	



MAX APCH TURNING SPEED:190kt IAS

BEARINGS, TRACKS AND RADIALS ARE MAGNETIC
ALTITUDES AND ELEVATIONS ARE IN FEET AND (METERS/m).
DISTANCES IN NAUTICAL MILES

BIGRO 6 A
Proceed from BIGRO to UJ. Cross GURIN at 2700 m and cross UJ at 2400 m.

CON 6 A
Descend on CON 191°M and cross FUSU at 3600 m or above, cross SAREX at 3300 m / 3600 m. At SAREX turn left to establish on NLG R351° to cross NLG at 3300 m/3600 m. Leave NLG at NLG R167° to cross LATOP at 2400 m, then proceed on MCU R020° to cross MCU at 2100 m.

If MCU is unserviceable, CON 6 A is not permitted, request CON 7 A STAR.

NLG 5 A
Leave NLG on NLG R167° to cross MCU DME 9.0 at 2400 m, then proceed on MCU R020° to cross MCU at 2100 m.

If MCU is unserviceable, NLG 5 A is not permitted, request NLG 6 A STAR.

POU 6 A
Descend on POU R120° to cross SAREX at 3300 m/3600 m. At SAREX turn right to establish on NLG R351° to cross NLG at 3300 m/3600 m. Leave NLG at NLG R167° to cross LATOP at 2400 m, then proceed on MCU R020° to cross MCU at 2100 m.

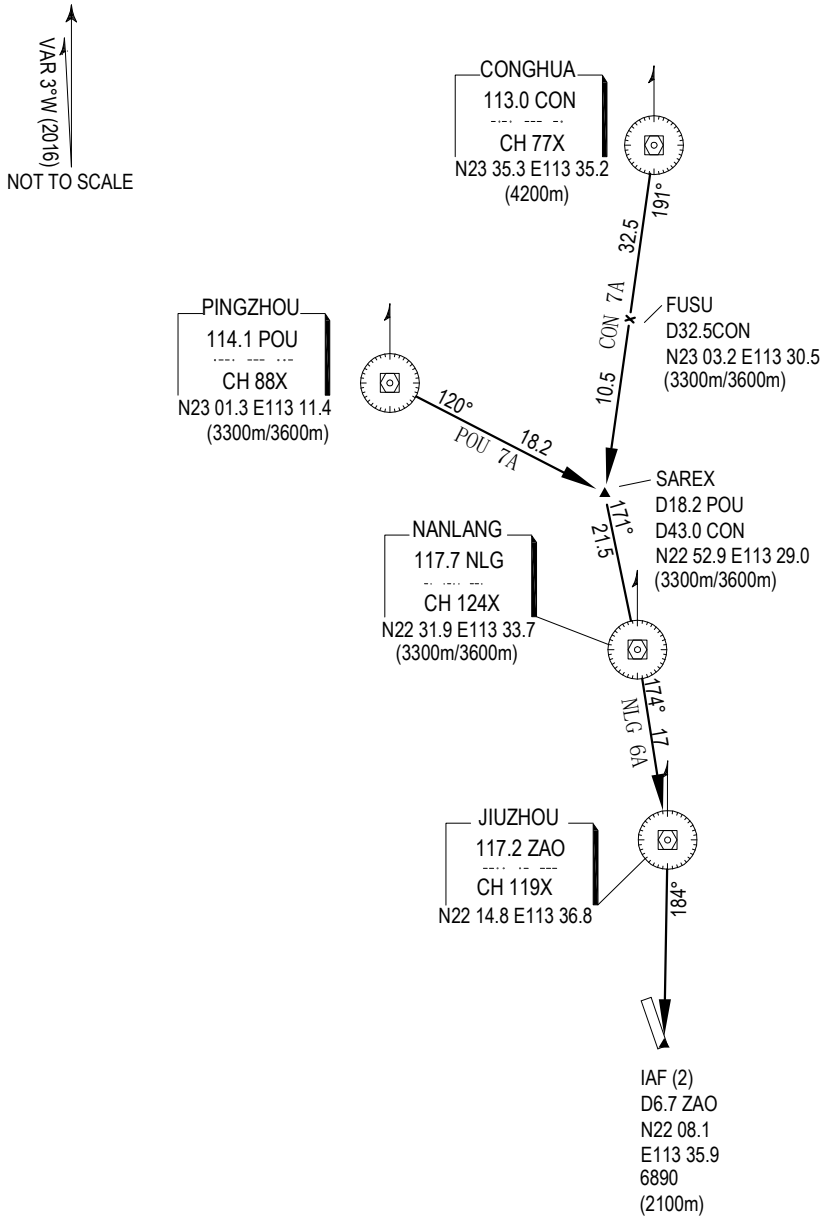
If MCU is unserviceable, POU 6 A is not permitted, request POU 7 A STAR.

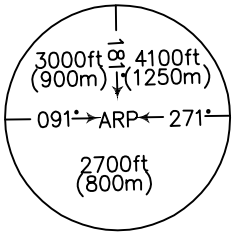
REMARK :
(1) Maximum approach turning speed: 190 kt IAS
(2) Standard Arrival Routes (STARS) to MIA Transiting Hong Kong Airspace
Speed control
(a) Speed control shall be in force unless other wise advised.
(b) Aircraft on STAR clearance shall fly at not more than 250 kt IAS whilst they are below FL 110.
Loss of communication
In the event of loss of communication, aircraft shall comply with the specified STAR procedure, then join the ILS approach to Macao RWY 34.

GUANG ZHOU FIR - HONG KONG FIR
STAR MACAO RWY 34
(CON 7 A, NLG 6 A, POU 7 A)
CAT A, B, C, D

TWR : MACAO Tower	118.0
APP : Zhuhai Approach	120.35 (124.25) (1)
APP : HONG KONG Radar	126.3 / 119.1 (2)
ATIS : MACAO	126.4

TA 9000ft(2700m)





MSA 25NM

MAX APCH TURNING SPEED:190kt IAS

BEARINGS, TRACKS AND RADIALS ARE MAGNETIC
ALTITUDES AND ELEVATIONS ARE IN FEET AND (METERS/m).
DISTANCES IN NAUTICAL MILES

CON 7 A
Descend on CON 191°M and cross FUSU at 3600 m or above, cross SAREX at 3300 m / 3600 m. At SAREX turn left to establish on NLG R351° to cross NLG at 3300 m/3600 m. Leave NLG at NLG R174° to ZAO, track on ZAO R184°, cross ZAO DME 6.7 NM at 2100 m.

NLG 6 A
Leave NLG at NLG R174° to ZAO, track on ZAO R184°, cross ZAO DME 6.7 NM at 2100 m.

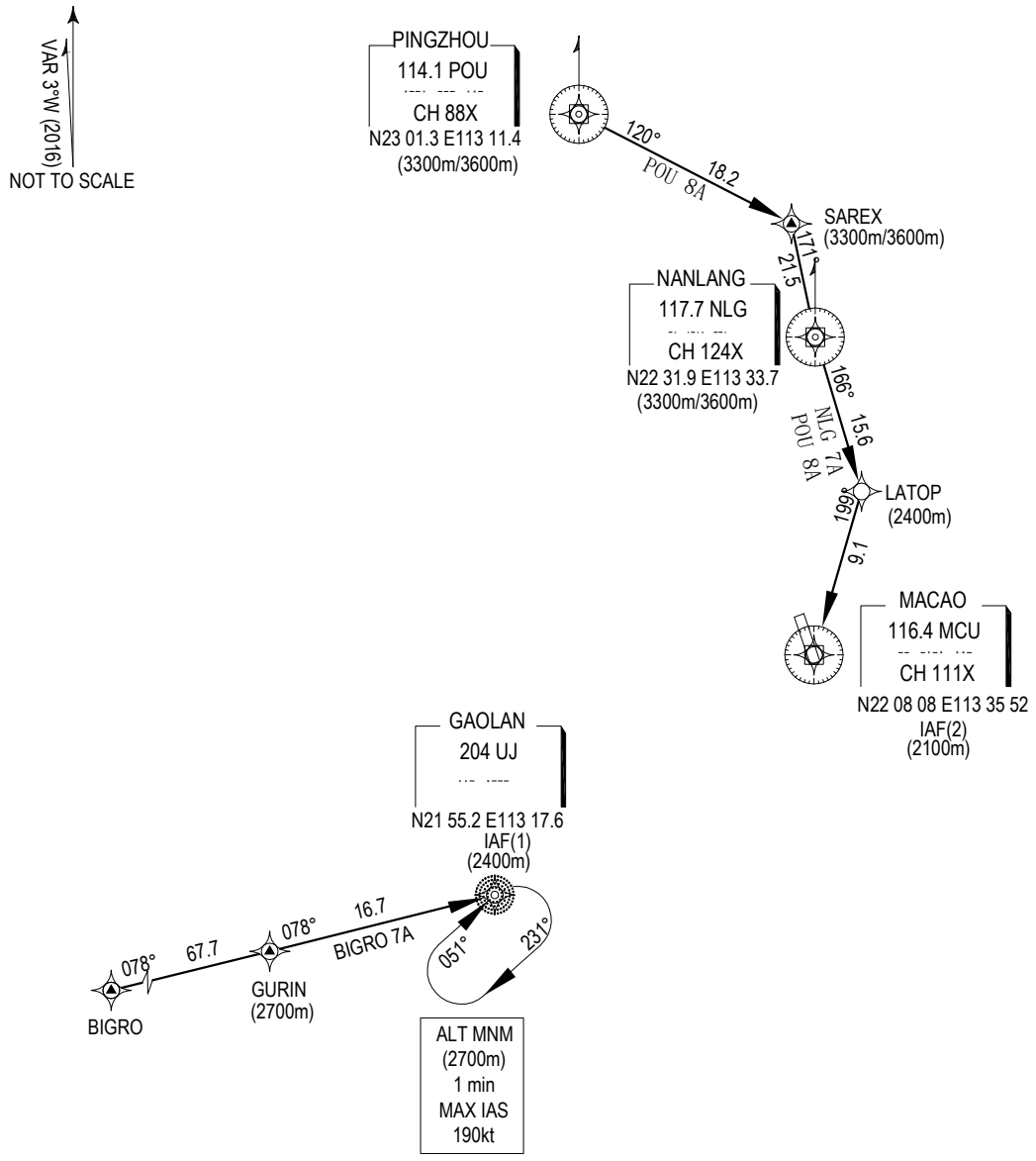
POU 7 A
Descend on POU R120° to cross SAREX at 3300 m/3600 m. At SAREX turn right to establish on NLG R351° to cross NLG at 3300 m/3600 m. Leave NLG at NLG R174° to ZAO, track on ZAO R184°, cross ZAO DME 6.7 NM at 2100 m.

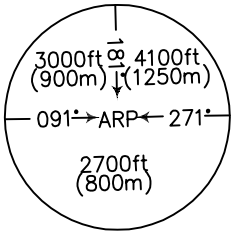
REMARK :
(1) These STARs are available when MCU is unserviceable.
(2) Maximum approach turning speed: 190 kt IAS

GUANG ZHOU FIR - HONG KONG FIR
RNAV(GNSS) STAR MACAO RWY 34
(BIGRO 7 A, NLG 7 A, POU 8 A)
CAT A, B, C, D

TWR : MACAO Tower	118.0
APP : Zhuhai Approach	120.35 (124.25) (1)
APP : HONG KONG Radar	126.3 / 119.1 (2)
ATIS : MACAO	126.4

TA 9000ft(2700m)





MSA 25NM

MAX APCH TURNING SPEED:190kt IAS

BEARINGS, TRACKS AND RADIALS ARE MAGNETIC
ALTITUDES AND ELEVATIONS ARE IN FEET AND (METERS/m).
DISTANCES IN NAUTICAL MILES

The procedure applied to BASIC RNP1,GNSS required.

BIGRO 7 A
From BIGRO to GURIN at 2700 m, to UJ at 2400 m.

NLG 7 A
From NLG to LATOP at 2400 m, to MCU at 2100 m.

POU 8 A
From POU to SAREX at 3300 m / 3600 m, to NLG at 3300 m / 3600 m, to LATOP at 2400 m, to MCU at 2100 m.

REMARK :
(1) For RNAV(GNSS) STAR aircraft must be approved by State of Registry in accordance with ICAO RNP1 standard or equivalent. Carriage of certified GNSS receiver is mandatory.
(2) Aircraft that do not have approval or whose RNP1/ P-RNAV capability has been degraded shall use the Conventional Procedure: BIGRO 6 A, NLG 5 A, POU 6 A, NLG 6 A or POU 7 A.
(3) Maximum approach turning speed: 190 kt IAS
(4) Loss of communication
In the event of loss of communication, aircraft shall comply with the specified STAR procedure, then join the Macao RWY 34approach.

FMC Database Coding Reference for RNAV(GNSS) STARs

BIGRO 7A

Sequence Number	Path Terminator	Waypoint	Fly-over	Track °M (°T)	Distance (NM)	Turn Dir	Altitude (ft)	Speed (knot)
001	IF	BIGRO	—	—	—	—	—	–
002	TF	GURIN	—	078(075)	67.7	—	8900	–
003	TF	UJ	—	078(075)	16.7	—	7900	–

NLG 7A (RWY34 STAR)

Sequence Number	Path Terminator	Waypoint	Fly-over	Track °M (°T)	Distance (NM)	Turn Dir	Altitude (ft)	Speed (knot)
001	IF	NLG	—	—	—	—	—	–
002	TF	LATOP	—	166(163)	15.6	—	7900	–
003	TF	MCU	—	199(196)	9.1	—	6900	–

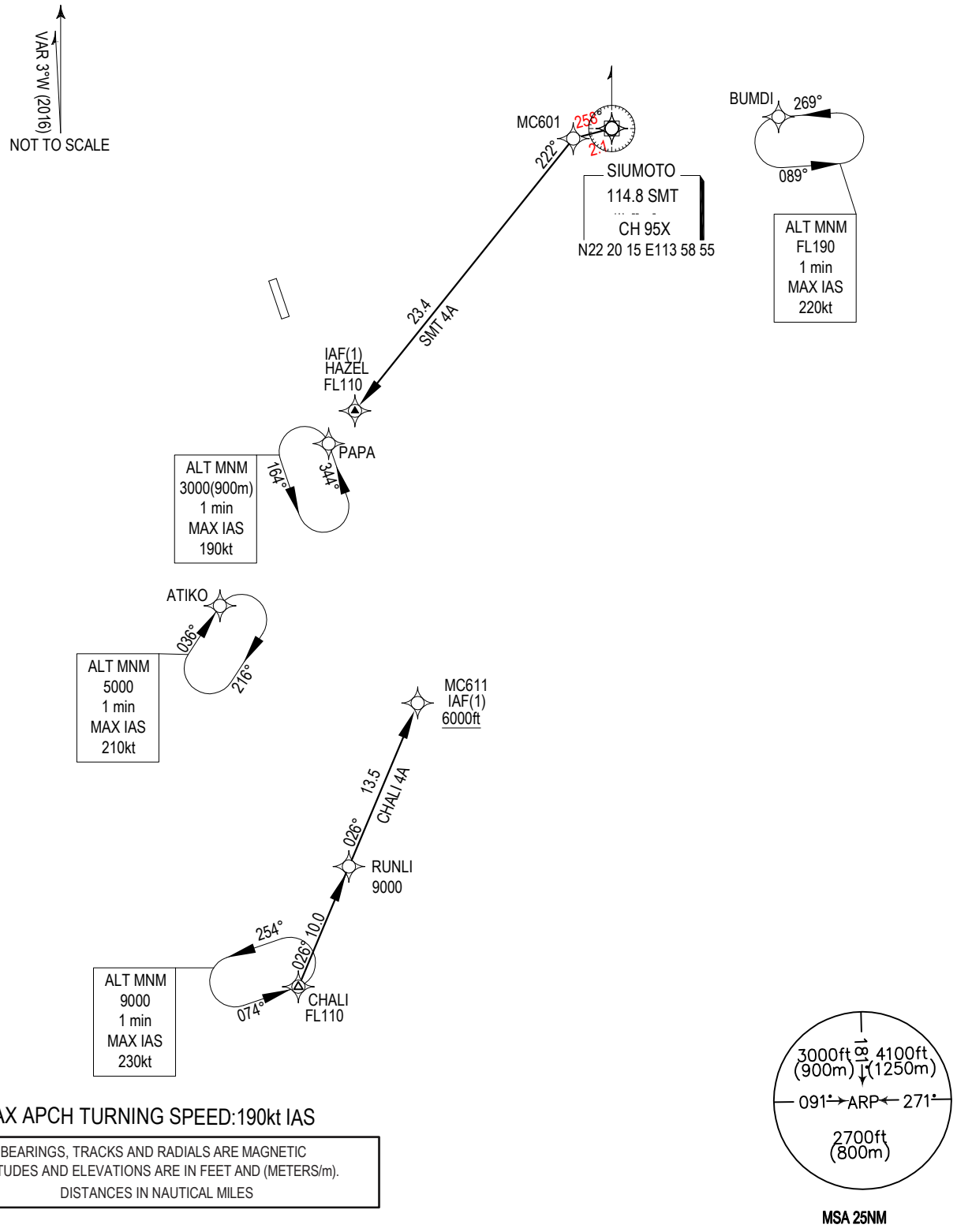
POU 8A

Sequence Number	Path Terminator	Waypoint	Fly-over	Track °M (°T)	Distance (NM)	Turn Dir	Altitude (ft)	Speed (knot)
001	IF	POU	—	—	—	—	10800	–
002	TF	SAREX	—	120(117)	18.2	—	10800	–
003	TF	NLG	—	171(168)	21.5	—	10800	–
004	TF	LATOP	—	166(163)	15.6	—	7900	–
005	TF	MCU	—	199(196)	9.1	—	6900	–

Waypoint Coordinates

Waypoint Name	Coordinates (WGS84)	
BIGRO	21°34.2'N	111°49.6'E
GURIN	21°51.1'N	113°00.0'E
UJ	21°55.2'N	113°17.6'E
POU	23°01.3'N	113°11.4'E
SAREX	22°52.9'N	113°29.0'E
NLG	22°31.9'N	113°33.7'E
LATOP	22°16.9'N	113°38.6'E
MCU	22°08'08"N	113°35'52"E

TWR : MACAO Tower	118.0
APP : Zhuhai Approach	120.35 (124.25) (1)
APP : HONG KONG Radar	126.3 / 119.1 (2)
ATIS : MACAO	126.4
TA 9000ft(2700m)	



MAX APCH TURNING SPEED:190kt IAS

BEARINGS, TRACKS AND RADIALS ARE MAGNETIC
ALTITUDES AND ELEVATIONS ARE IN FEET AND (METERS/m).
DISTANCES IN NAUTICAL MILES

The procedure applied to BASIC RNP1,GNSS required.

CHALI 4 A
Leave CHALI at FL 110, Turn left to RUNLI at 9000 ft, to MC611 at or above 6000 ft descending to 3000ft. **DO NOT DESCEND WITHOUT ATC CLEARANCE.**

Conventional Procedure
Leave CHALI on CH R206° to intercept MCU R164°, descending from FL 110 to 3000 ft. IF MCU is not available, From IAF, turn left to track 344 ºM. Expect ILS approach to RWY 34.

SMT 4 A
Leave SMT to MC601, turn left to HAZEL at FL 110. **DO NOT DESCEND WITHOUT ATC CLEARANCE.**

Conventional Procedure
Leave SMT on R255º. At SMT DME 2.0 turn left track direct to HAZEL. Cross HAZEL at FL 110.

REMARK :
(1) For RNAV(GNSS) STAR aircraft must be approved by State of Registry in accordance with ICAO RNP1 standard or equivalent. Carriage of certified GNSS receiver is mandatory.
(2) Aircraft that do not have approval or whose RNP1/ P-RNAV capability has been degraded shall use the Conventional Procedure.
(3) Maximum approach turning speed: 190 kt IAS
(4) Standard Arrival Routes (STARS) to MIA Transiting Hong Kong Airspace
Speed control
Speed control shall be in force unless otherwise advised. Aircraft on STAR clearance shall fly at not more than 250 kt IAS whilst they are below FL 110.
Loss of communication
In the event of loss of communication, aircraft shall comply with the specified STAR procedure, then join the Macao RWY 34 approach.
Holding
The holding patterns for CHALI STAR are established at CHALI, PAPA and ATIKO. The holding patterns for SMT STAR are established at BUMDI, PAPA and ATIKO. In the event of holding, each flight will be instructed individually. In order to provide traffic management flexibility, traffic may be instructed to hold at other terminal holding (see HK AIP) as directed by ATC.

FMC Database Coding Reference for RNAV(GNSS) STARs

CHALI 4 A

Sequence Number	Path Terminator	Waypoint	Fly-over	Track °M (°T)	Distance (NM)	Turn Dir	Altitude (ft)	Speed (knot)
001	IF	CHALI	—	—	—	—	11000	—
002	TF	RUNLI	—	026(023)	10.0	—	9000	—
003	TF	MC611	—	026(023)	13.5	—	+6000	—

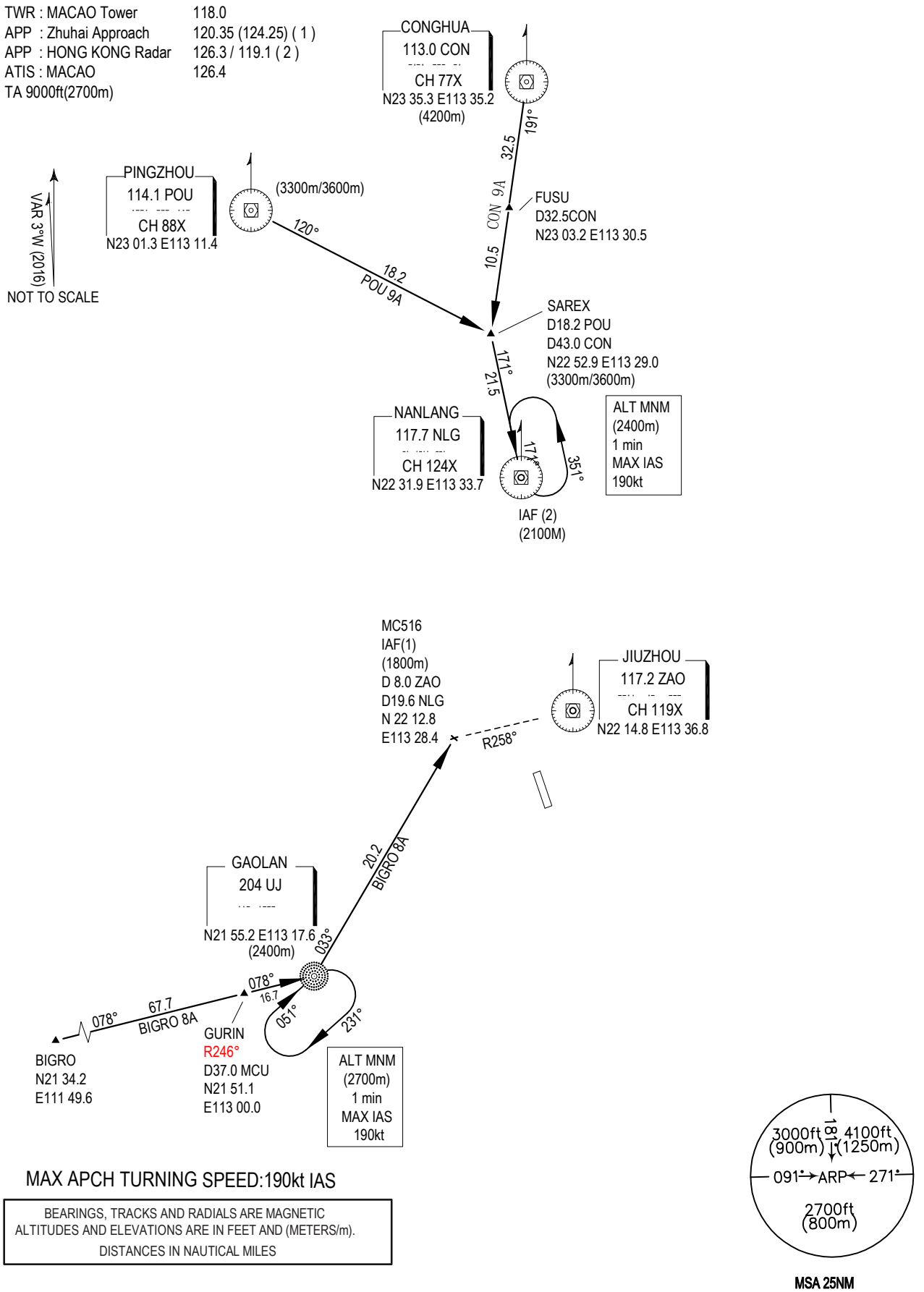
SMT 4 A

Sequence Number	Path Terminator	Waypoint	Fly-over	Track °M (°T)	Distance (NM)	Turn Dir	Altitude (ft)	Speed (knot)
001	IF	SMT	—	—	—	—	—	–
002	TF	MC601	—	258(255)	2.1	L	—	–
003	TF	HAZEL	—	222(219)	23.4	—	11000	–

Waypoint Coordinates

Waypoint Name	Coordinates (WGS84)		Waypoint Name	Coordinates (WGS84)	
CHALI	21°17'45.00"N	113°36'41.00"E	HAZEL	22°01'26.49"N	113°40'56.63"E
RUNLI	21°26'59.72"N	113°40'51.00"E	ATIKO	21°48'29.56"N	113°32'26.04"E
MC611	21°39'36.00"N	113°46'30.00"E	BUMDI	22°21'39.62"N	114°18'52.61"E
SMT	22°20'15.43"N	113°58'55.46"E	PAPA	21°58'39"N	113°39'22"E
MC601	22°19'43.55"N	113°56'43.60"E			

GUANG ZHOU FIR - HONG KONG FIR
STAR MACAO RWY 16
(BIGRO 8 A, CON 9 A, POU 9 A)
CAT A, B, C, D



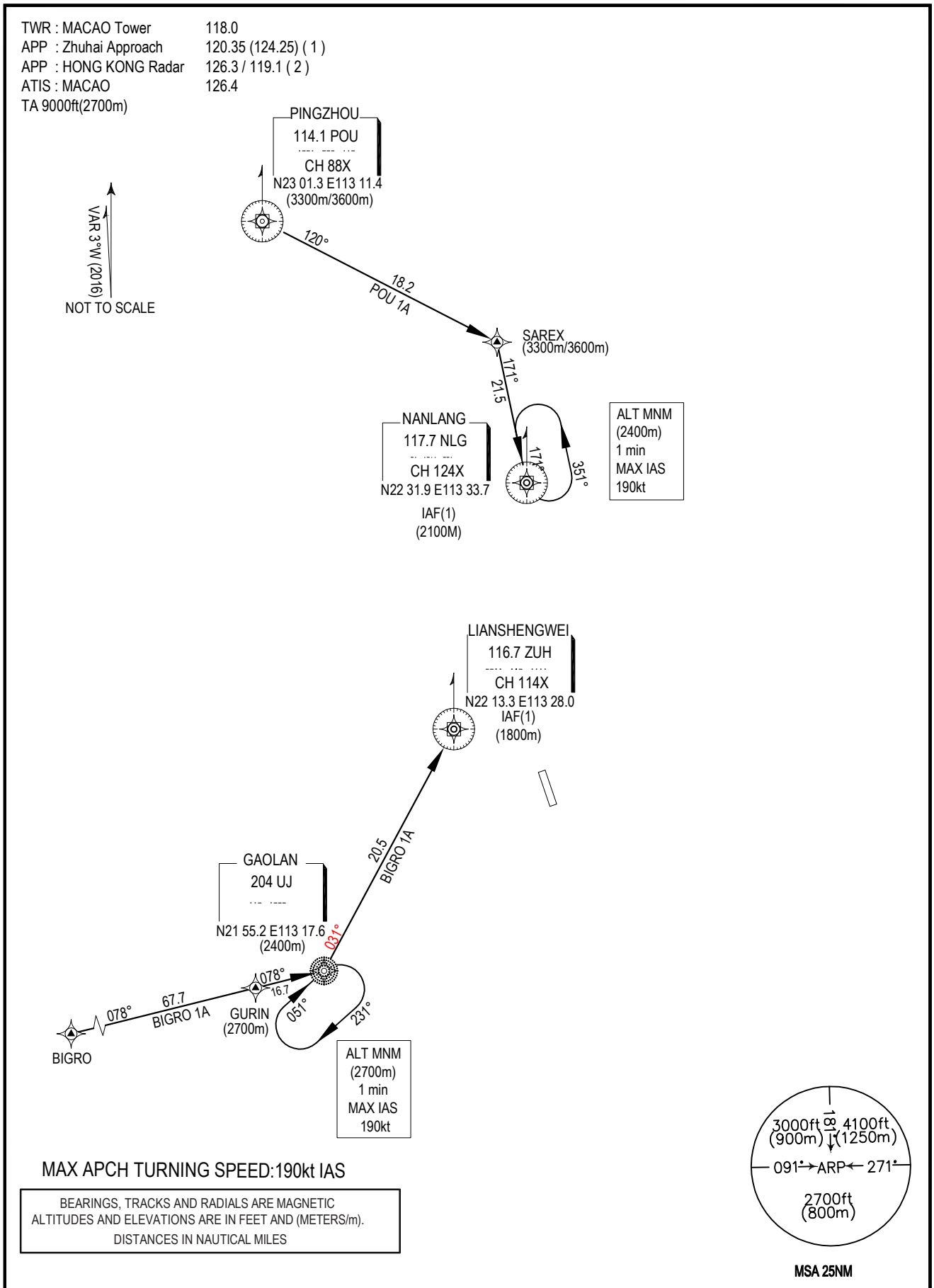
BIGRO 8 A
Proceed from BIGRO to UJ and cross GURIN at 2700 m. Leave UJ at 2400 m and turn left to establish on UJ R033° to MC516 (ZAO R258° DME 8.0).

CON 9 A
Descend on CON 191°M and cross FUSU at 3600 m or above, cross SAREX at 3300 m / 3600 m. At SAREX turn left to establish on NLG R351° to cross NLG at 2100 m.

POU 9 A
Descend on POU R120° to cross SAREX at 3300 m/3600 m. At SAREX turn right to establish on NLG R351° to cross NLG at 2100 m.

REMARK :
(1) Maximum approach turning speed: 190 kt IAS

GUANG ZHOU FIR - HONG KONG FIR
RNAV(GNSS) STAR MACAO RWY 16
(BIGRO 1 A, POU 1 A)
CAT A, B, C, D



MAX APCH TURNING SPEED:190kt IAS

BEARINGS, TRACKS AND RADIALS ARE MAGNETIC
ALTITUDES AND ELEVATIONS ARE IN FEET AND (METERS/m).
DISTANCES IN NAUTICAL MILES

The procedure applied to BASIC RNP1,GNSS required.

BIGRO 1 A
From BIGRO to GURIN at 2700 m., to UJ at 2400 m and to ZUH at 1800 m .

POU 1 A
From POU to SAREX 3300 m/3600 m,, to NLG at 2100 m.

REMARK :
(1) For RNAV(GNSS) STAR aircraft must be approved by State of Registry in accordance with ICAO RNP1 standard or equivalent. Carriage of certified GNSS receiver is mandatory.
(2) Aircraft that do not have approval or whose RNP1/ P-RNAV capability has been degraded shall use the Conventional Procedure: BIGRO 8 A or POU 9 A.
(3) Maximum approach turning speed: 190 kt IAS
(4) Loss of communication:
In the event of loss of communication, aircraft shall comply with the specified STAR procedure, then join the Macao RWY 16 approach.

FMC Database Coding Reference for RNAV(GNSS) STARs

BIGRO 1A

Sequence Number	Path Terminator	Waypoint	Fly-over	Track °M (°T)	Distance (NM)	Turn Dir	Altitude (ft)	Speed (knot)
001	IF	BIGRO	—	—	—	—	—	–
002	TF	GURIN	—	078(075)	67.7	—	8900	–
003	TF	UJ	—	078(075)	16.7	—	7900	–
004	TF	ZUH	—	031(028)	20.5	—	5900	–

POU 1A

Sequence Number	Path Terminator	Waypoint	Fly-over	Track °M (°T)	Distance (NM)	Turn Dir	Altitude (ft)	Speed (knot)
001	IF	POU	—	—	—	—	10800	–
002	TF	SAREX	—	120(117)	18.2	—	10800	–
003	TF	NLG	—	171(168)	21.5	—	6900	–

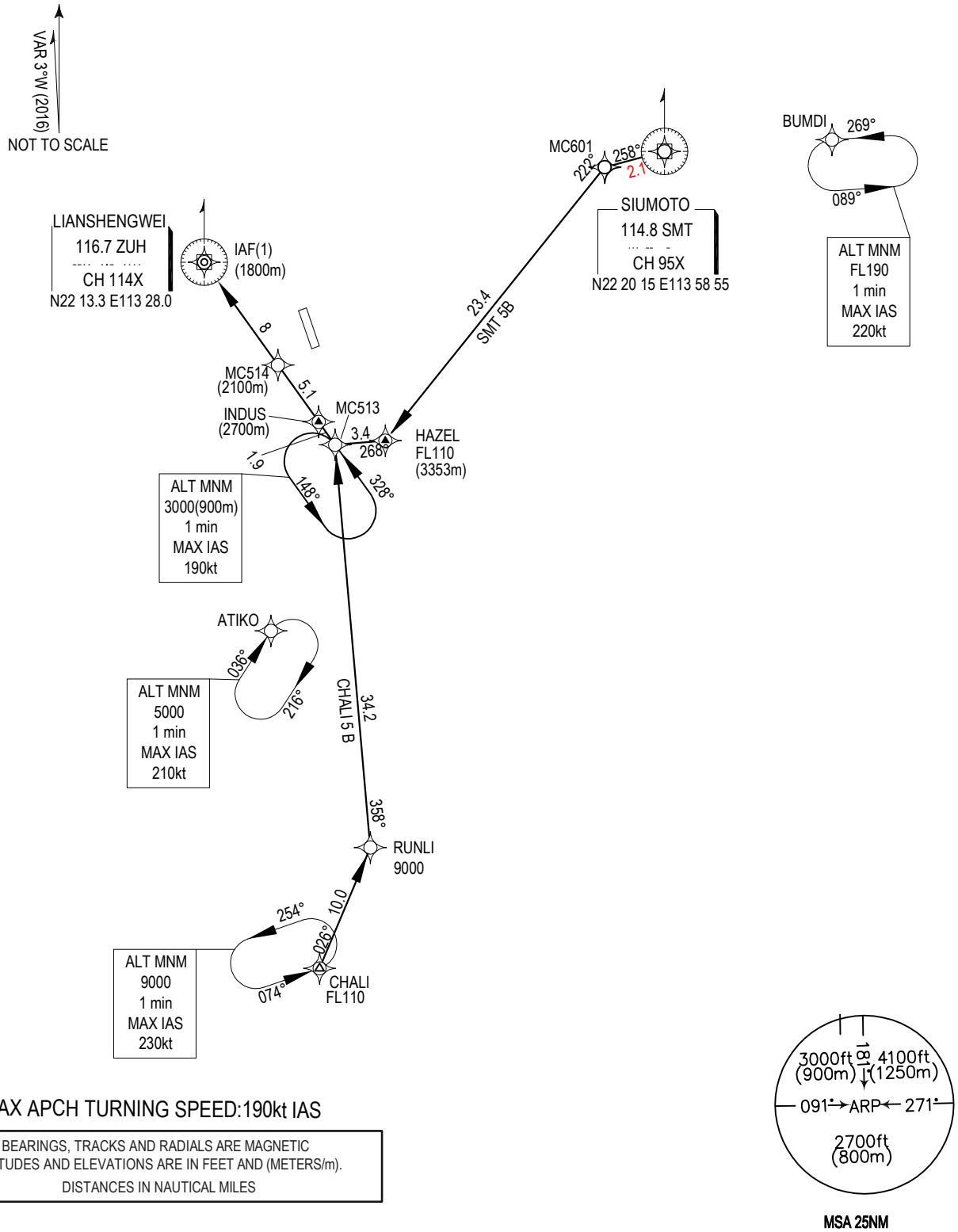
Waypoint Coordinates

Waypoint Name	Coordinates (WGS84)	
POU	23°01.3′N	113°11.4′E
SAREX	22°52.9′N	113°29.0′E
NLG	22°31.9′N	113°33.7′E
BIGRO	21°34.2′N	111°49.6′E
GURIN	21°51.1′N	113°00.0′E
UJ	21°55.2′N	113°17.6′E
ZUH	22°13.3′N	113°28.0′E

GUANG ZHOU FIR - HONG KONG FIR
RNAV(GNSS) STAR MACAO RWY 16
(CHALI 5 B, SMT 5 B)
CAT A, B, C, D

TWR : MACAO Tower	118.0
APP : Zhuhai Approach	120.35 (124.25) (1)
APP : HONG KONG Radar	126.3 / 119.1 (2)
ATIS : MACAO	126.4

TA 9000ft(2700m)



MAX APCH TURNING SPEED:190kt IAS

BEARINGS, TRACKS AND RADIALS ARE MAGNETIC
ALTITUDES AND ELEVATIONS ARE IN FEET AND (METERS/m).
DISTANCES IN NAUTICAL MILES

The procedure applied to BASIC RNP1,GNSS required.

CHALI 5 B

Descend from CHALI at FL 110, Turn left to RUNLI at 9000 ft. Turn left to MC513, to INDUS at 2700m, to MC514 at 2100 m and to ZUH at 1800 m. **DO NOT DESCEND WITHOUT ATC CLEARANCE.**

Conventional Procedure

Descend from CHALI at FL 110 to RUNLI then turn left to MC513. Then establish on ZUH R148° to ZUH. Cross INDUS at 2700m, cross ZUH DME 8.0 at 2100 m and reach 1800 m by ZUH.

SMT 5 B

Leave SMT to MC601. Turn left to HAZEL at FL110 (3353m). Turn right to MC513, to INDUS at 2700 m, to MC514 at 2100 m and to ZUH at 1800 m. **DO NOT DESCEND WITHOUT ATC CLEARANCE.**

Conventional Procedure

Leave SMT on R255 °. At SMT DME 2.0 turn left track direct to HAZEL. Cross HAZEL at FL 110. Turn right track direct to INDUS at 2700 m, cross ZUH DME 8.0 at 2100 and cross ZUH at 1800 m.

REMARK :

(1) For RNAV(GNSS) STAR aircraft must be approved by State of Registry in accordance with ICAO RNP1 standard or equivalent. Carriage of certified GNSS receiver is mandatory.
(2) Aircraft that do not have approval or whose RNP1/ P-RNAV capability has been degraded shall use the Conventional Procedure:
(3) Maximum approach turning speed: 190 kt IAS
(4) Standard Arrival Routes (STARS) to MIA Transiting Hong Kong Airspace

Speed control

Speed control shall be in force unless otherwise advised. Aircraft on STAR clearance shall fly at not more than 250 kt IAS whilst they are below FL 110.

Loss of communication

In the event of loss of communication, aircraft shall comply with the specified STAR procedure, then join the Macao RWY 16 approach.

Holding

The holding patterns for CHALI STAR are established at CHALI, MC513 and ATIKO. The holding patterns for SMT STAR are established at BUMDI, MC513 and ATIKO. In the event of holding, each flight will be instructed individually. In order to provide traffic management flexibility, traffic may be instructed to hold at other terminal holding (see HK AIP) as directed by ATC.

FMC Database Coding Reference for RNAV(GNSS) STARs

CHALI 5 B

Sequence Number	Path Terminator	Waypoint	Fly-over	Track °M (°T)	Distance (NM)	Turn Dir	Altitude (ft)	Speed (knot)
001	IF	CHALI	—	—	—	—	11000	–
002	TF	RUNLI	—	026(023)	10	L	9000	–
003	TF	MC513	—	328(325)	34.2	L	—	–
004	TF	INDUS	—	328(325)	1.9	—	8900	–
005	TF	MC514	—	328(325)	5.1	—	6900	–
006	TF	ZUH	—	328(325)	8	—	5900	–

SMT 5 B

Sequence Number	Path Terminator	Waypoint	Fly-over	Track °M (°T)	Distance (NM)	Turn Dir	Altitude (ft)	Speed (knot)
001	IF	SMT	—	—	—	—	—	–
002	TF	MC601	—	258(255)	2.1	L	—	–
003	TF	HAZEL	—	222(219)	23.4	R	11000	–
004	TF	MC513	—	268(265)	3.4	R	—	–
005	TF	INDUS	—	328(325)	1.9	—	8900	–
006	TF	MC514	—	328(325)	5.1	—	6900	–
007	TF	ZUH	—	328(325)	8	—	5900	–

Waypoint Coordinates

Waypoint Name	Coordinates (WGS84)		Waypoint Name	Coordinates (WGS84)	
CHALI	21°17′45.00″N	113°36′41.00″E	SMT	22°20′15″N	113°58′55″E
RUNLI	21°26′59.72″N	113°40′51.00″E	MC601	22°19′43.55″N	113°56′43.60″E
MC513	22°01′09.95″N	113°37′20.04″E	HAZEL	22°01′26.49″N	113°40′56.63″E
INDUS	22°02′41.0″N	113°36′01.0″E	ATIKO	21°48′29.56″N	113°32′26.04″E
MC514	22°06′52.19″N	113°32′56.82″E	BUMDI	22°21’39.62″N	114°18′52.61″E
ZUH	22°13.3′N	113°28.0′E			

INSTRUMENT APPROACH CHART - ICAO

PROTECTED FOR A B C D CAT

HEIGHTS RELATED TO AD. ELEV 20 (1 hPa)

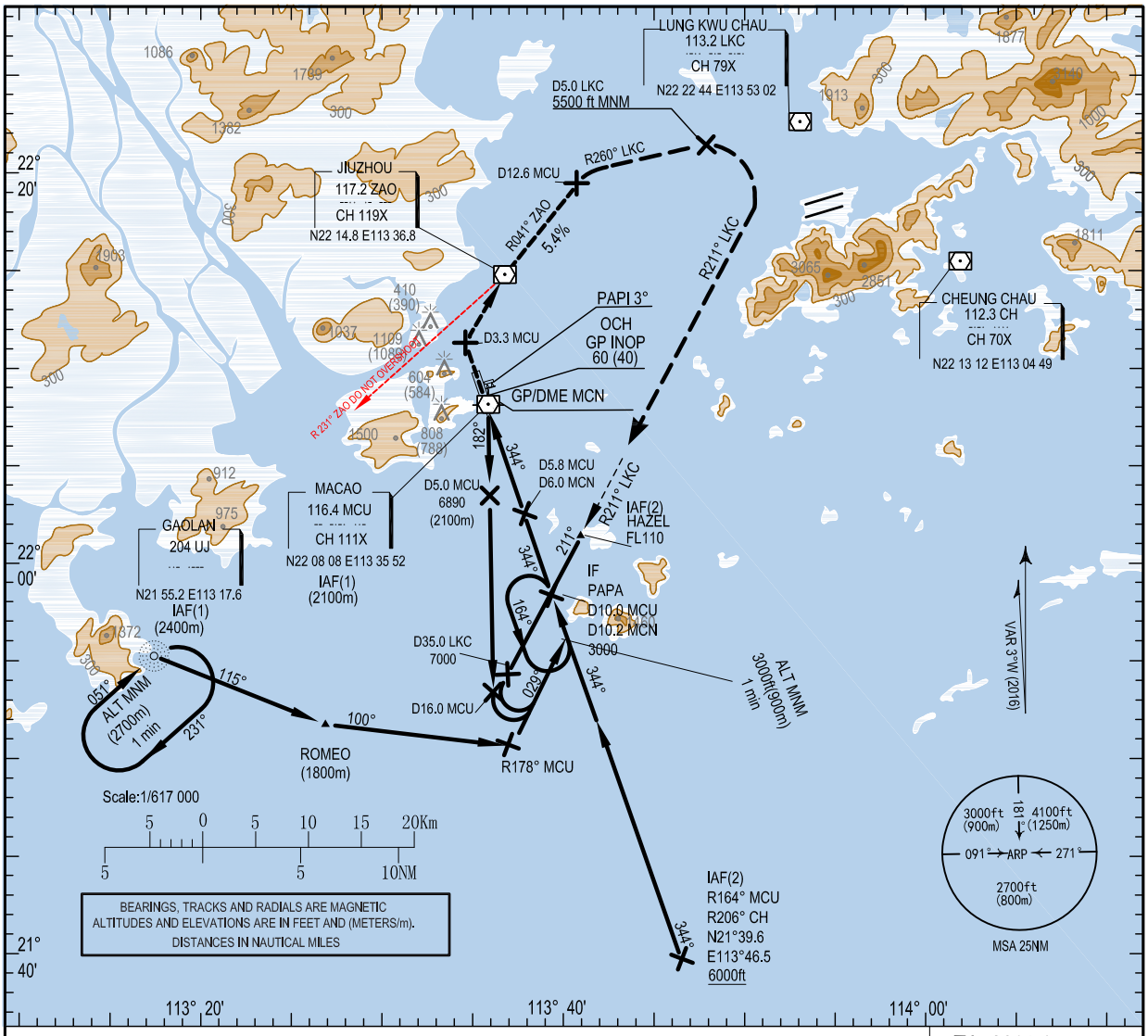
ATIS MACAO : 126.4
APP : ZHUHAI Approach 120.35 (124.25) (1)
HONG KONG Radar 126.3 / 119.1(2)
TWR : MACAO Tower 118.0
MACAO Ground 121.725 / 121.975

24 MAY 2018

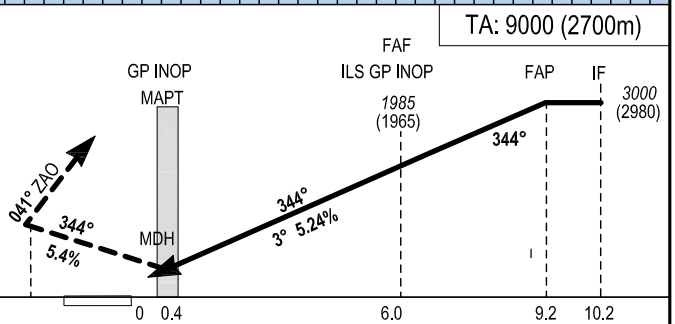
AD 2 - VMMC - 69

ILS z RWY 34

ILS
MCN 109.7
RDH: 54
MAX APCH TURNING SPEED : 190 kt IAS
MAX MISSED APCH TURNING SPEED : 185 kt IAS



MISSED APPROACH (2): (MNM climb gradient 5.4% required until passing 5500 ft) Climb on runway heading to 600 ft (183 m). At or before MCU 3.3 NM turn right (MAX IAS 185 kt) to ZAO, climbing to 1200 m (3937 ft). Leave ZAO on ZAO R041°. At MCU 12.6 NM turn right to intercept LKC R260°, continue climbing to 6000 ft (1829 m). At LKC 5.0 NM and altitude at or above 5500 ft turn right to establish on LKC R211° and at LKC 35.0 NM descend to 3000 ft and turn left on track 029°M to intercept Macao RWY 34 final approach track, or expect radar vectoring by Hong Kong ATC via the most expeditious means to Macau RWY 34 final approach.
If ZAO is unserviceable, Climb on runway heading, at MCU 3.3 NM turn right (MAX IAS 185kt) on track 041°M. Then turn right by MCU 13.1 NM at altitude 1200m (3937ft) to intercept LKC VOR R260°, continue climbing to 6000ft (1829m) and continue the above procedure.



Standard MNM : vertical distances in feet, horizontal visibility in meters.

REF HEIGHT : ALT SDE.

CAT	ILS CAT I DA(DH)	ILS CAT I HV(RVR)	ILS CAT II DA(DH)	ILS CAT II RVR	GP INOP OCH : 286 MDH	GP INOP OCH : 286 HV	CIRCLING MDH	CIRCLING HV	OCH CAT I	OCH CAT II
A	220(200)	800	120(100)	350	290	1200	SEE CHART AD 2 - VMMC - 72		A : 141	A : 49
B	220(200)	800	120(100)	350	290	1200			B : 150	B : 62
C	220(200)	800	120(100)	350	290	1200			C : 164	C : 76
D	220(200)	800	120(100)	350	290	1600			D : 171	D : 89

GP/DME MCN							
NM	7	6	5	4	3	2	1
ALT	2303	1985	1666	1348	1029	711	392
(HEIGHT)	(2283)	(1965)	(1646)	(1328)	(1009)	(691)	(372)

Remarks : (3)OCH ILS CAT I (CAT A, B, C, D) AND CAT II (CAT D) - CAT II (CAT A, B, C) ground plane. (4)MCN/DME is provided from the displaced threshold

FAF - Displaced THR	6.0 NM	70 kt	85 kt	100 kt	115 kt	130 kt	160 kt	185 kt
		5 min 09	4 min 14	3 min 36	3 min 08	2 min 46	2 min 15	1 min 57

INTENTIONALLY

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INSTRUMENT APPROACH CHART - ICAO

PROTECTED FOR A B C D CAT

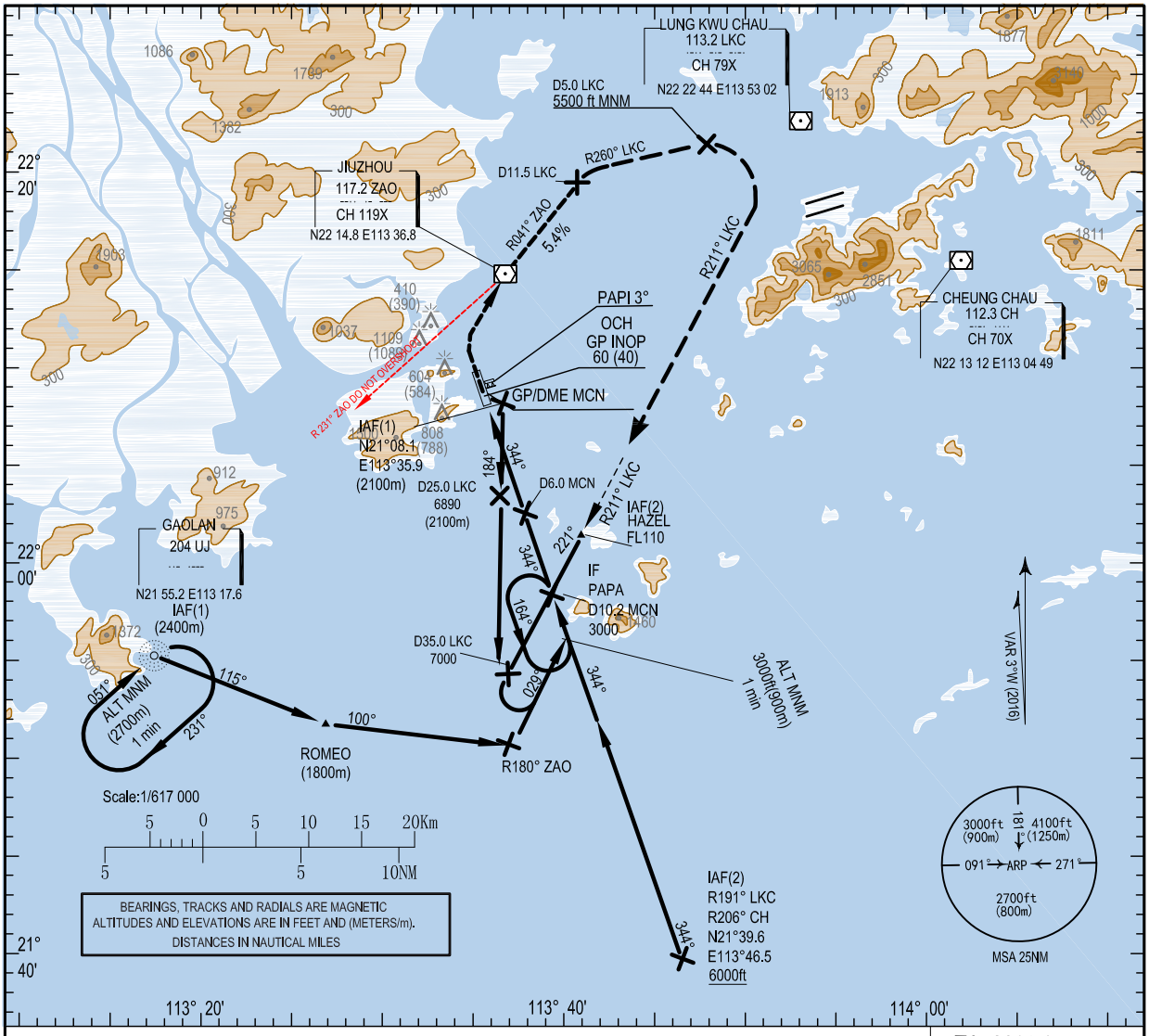
HEIGHTS RELATED TO AD. ELEV *20 (1 hPa)*

ATIS MACAO : 126.4
APP : ZHUHAI Approach 120.35 (124.25) (1)
HONG KONG Radar 126.3 / 119.1(2)
TWR : MACAO Tower 118.0
MACAO Ground 121.725 / 121.975

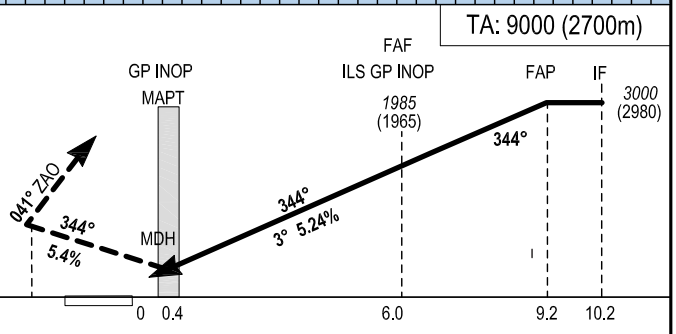
23 MAY 2019

AD 2 - VMMC - 69A
ILS y RWY 34
(MCU Unserviceable)

ILS
MCN 109.7
RDH: 54
MAX APCH TURNING SPEED : 190 kt IAS
MAX MISSED APCH TURNING SPEED : 185 kt IAS



MISSED APPROACH (2): *(MNM climb gradient 5.4% required until passing 5500 ft)*
Climb on runway heading to 600 ft (183 m) turn right (MAX IAS 185 kt) to ZAO, climbing to 1200 m (3937 ft). Leave ZAO on ZAO R041°. At LKC 11.5 turn right to intercept LKC R260°, continue climbing to 6000 ft (1829 m). At LKC 5.0 NM and altitude at or above 5500 ft turn right to establish on LKC R211° and at LKC 35.0 NM descend to 3000 ft and turn left on track 029°M to intercept Macau RWY 34 final approach track,or expect radar vectoring by Hong Kong ATC via the most expeditious means to Macau RWY 34 final approach.



Standard MNM : vertical distances in feet, horizontal visibility in meters.

REF HEIGHT : ALT SDE.

CAT	ILS CAT I		ILS CAT II		GP INOP OCH : 286		CIRCLING		OCH CAT I	OCH CAT II
	DA(DH)	HV(RVR)	DA(DH)	RVR	MDH	HV	MDH	HV		
A	220(200)	800	120(100)	350	290	1200	SEE CHART AD 2 - VMMC - 72		A : 141	A : 49
B	220(200)	800	120(100)	350	290	1200			B : 150	B : 62
C	220(200)	800	120(100)	350	290	1200			C : 164	C : 76
D	220(200)	800	120(100)	350	290	1600			D : 171	D : 89

GP/DME MCN							
NM	7	6	5	4	3	2	1
ALT	2303	1985	1666	1348	1029	711	392
(HEIGHT)	(2283)	(1965)	(1646)	(1328)	(1009)	(691)	(372)

Remarks : (3)OCH ILS CAT I (CAT A, B, C, D) AND CAT II (CAT D) - CAT II (CAT A, B, C) ground plane. (4)MCN/DME is provided from the displaced threshold

FAF - Displaced THR	6.0 NM	70 kt	85 kt	100 kt	115 kt	130 kt	160 kt	185 kt
		5 min 09	4 min 14	3 min 36	3 min 08	2 min 46	2 min 15	1 min 57

INTENTIONALLY

LEFT

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INSTRUMENT APPROACH CHART - ICAO

HEIGHTS RELATED TO AD. ELEV *20 (1 hPa)*

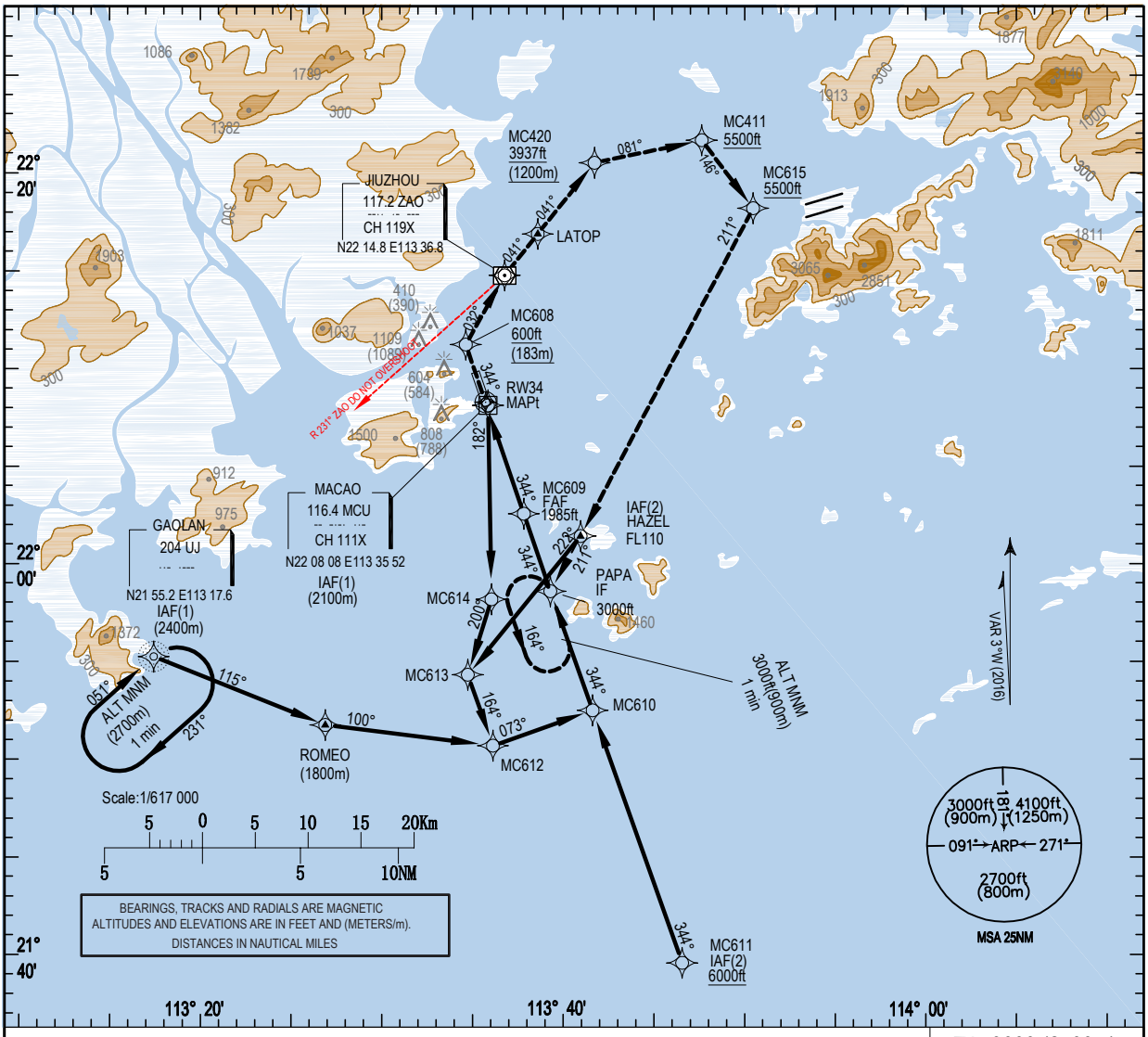
ATIS MACAO : 126.4
APP : ZHUHAI Approach 120.35 (124.25) (1)
HONG KONG Radar 126.3 / 119.1(2)
TWR : MACAO Tower 118.0
MACAO Ground 121.725 / 121.975

AD 2 - VMMC - 69B
RNAV(GNSS) RWY 34

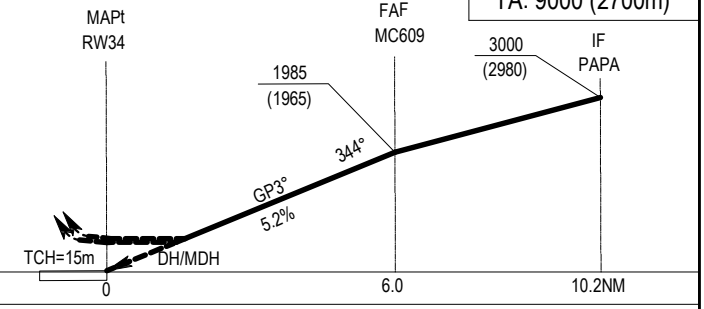
PROTECTED FOR A B C D CAT

04 JAN 2018

Minimum Temperature:+5℃
MAX APCH TURNING SPEED : 190 kt IAS
MAX MISSED APCH TURNING SPEED : 185 kt IAS



MISSED APPROACH
(MNM climb gradient 5.4% required until passing 5500 ft) Climb to MC608 at 600 ft (183m) or above, turn right track to ZAO, LATOP, MC420 at 1200m (3937 ft) or above. Track to MC411 at or above 5500 ft and continue climb to 6000 ft or as instructed by ATC. Then fly by MC615 on track 210M to HAZEL, PAPA, MC613 and MC612, or proceed as directed by ATC. When requested, join the holding pattern at PAPA at 3000ft or above, or proceed as directed by ATC.



MAPT ← (NM)

Standard MNM:vertical distances in feet,horizontal visibility in meters.

CAT	VNAV/LNAV		LNAV		CIRCLING	
	DA/DH	HV	MDA/MDH	HV	MDA/MDH	HV
A	540/520	2700	570/550	2900	SEE CHART AD2-VMMC-72	
B	540/520	2700	570/550	2900		
C	540/520	2700	570/550	2900		
D	540/520	2700	570/550	2900		

MAPT(RW34)

NM	6	5	4	3	2	1
ALT	1985	1663	1344	1026	707	388
(HEIGHT)	(1965)	(1643)	(1324)	(1006)	(687)	(368)

FAF-MAPT	6.0NM	70kt	85kt	100kt	115kt	130kt	145kt	160kt	185kt
		5 min 09	4 min 14	3 min 36	3 min 08	2 min 46	2 min 28	2 min 15	1 min 57

FMC Database Coding Reference for RWY34 RNP APCH

Seq. Nr.	Path Terminator	Waypoint	FAF MAP	Fly-over	Track °M (°T)	Distance (NM)	Turn Dir	Altitude (ft)	Speed (knot)	VPA/ TCH	Navigation Specification
001	IF	PAPA	—	—	—	—	—	3000	-190	—	RNP APCH
002	TF	MC609	F	—	344(341)	4.2	—	1985	-190	3.00	RNP APCH
003	TF	RW34	M	Y	344(341)	6.0	—	570	-185	3.00	RNP APCH
004	TF	MC608	—	—	344(341)	3.1	—	+600	-185	—	RNP APCH
005	TF	ZAO	—	—	032(029)	4.0	—	—	-185	—	RNP APCH
006	TF	LATOP	—	—	041(038)	2.7	—	—	—	—	RNP APCH
007	TF	MC420	—	—	041(038)	4.7	R	+3900	—	—	RNP APCH
008	TF	MC411	—	—	081(078)	5.6	—	+5500	—	—	RNP APCH
009	TF	MC615	—	—	146(143)	4.4	—	+5500	—	—	RNP APCH
010	TF	HAZEL	—	—	211(208)	18.9	—	—	—	—	RNP APCH
011	TF	PAPA	—	—	211(208)	3.1	—	—	—	—	RNP APCH
012	HM	PAPA	—	Y	344(341)	—	—	3000	-185	—	RNP APCH
001	IF	MCU	—	—	—	—	—	6900	—	—	RNP APCH
002	TF	MC614	—	—	182(179)	9.9	—	—	—	—	RNP APCH
003	TF	MC613	—	—	200(197)	4.0	—	—	—	—	RNP APCH
004	TF	MC612	—	—	164(161)	3.8	—	—	—	—	RNP APCH
005	TF	MC610	—	—	073(070)	5.4	—	—	—	—	RNP APCH
006	TF	PAPA	—	—	344(341)	6.5	—	3000	-190	—	RNP APCH
001	IF	MC611	—	—	—	—	—	+6000	—	—	RNP APCH
002	TF	MC610	—	—	344(341)	13.7	—	—	—	—	RNP APCH
003	TF	PAPA	—	—	344(341)	6.5	—	3000	-190	—	RNP APCH
001	IF	UJ	—	—	—	—	—	7900	—	—	RNP APCH
002	TF	ROMEO	—	—	115(112)	9.4	—	5900	—	—	RNP APCH
003	TF	MC612	—	—	100(097)	8.6	—	—	—		RNP APCH
004	TF	MC610	—	—	073(070)	5.4	—	—	—	—	RNP APCH
005	TF	PAPA	—	—	343(341)	6.5	—	3000	-190	—	RNP APCH
001	IF	HAZEL	—	—	—	—	—	11000	—	—	RNP APCH
002	TF	MC613	—	—	222(219)	9.1	—	—	—	—	RNP APCH
003	TF	MC612	—	—	164(161)	3.8	—	—	—	—	RNP APCH
004	TF	MC610	—	—	073(070)	5.4	—	—	—	—	RNP APCH
005	TF	PAPA	—	—	344(341)	6.5	—	3000	-190	—	RNP APCH

Waypoint Coordinates

Waypoint Name	Coordinates	(WGS84)	Waypoint Name	Coordinates	(WGS84)
HAZEL	22°01'26.49"N	113°40'56.63"E	MC613	21°54'20.84"N	113°34'45.32"E
LATOP	22°16.9'N	113°38.6'E	MC614	21°58'12.27"N	113°36'03.19"E
MC411	22°21'41.20"N	113°47'37.58"E	MC615	22°18'12.10"N	113°50'26.77"E
MC420	22°20'32.29"N	113°41'43.59"E	MCU	22°08'08"N	113°35'52"E
MC608	22°11'14.42"N	113°34'38.75"E	PAPA	21°58'39"N	113°39'22"E
MC609	22°02'35.07"N	113°37'49.87"E	ROMEO	21°51.8'N	113°26.9'E
MC610	21°52'31.46"N	113°41'36.15"E	RW34	22°08'17.46"N	113°35'43.91"E
MC611	21°39'36.00"N	113°46'30.00"E	UJ	21°55.2'N	113°17.6'E
MC612	21°50'42.92"N	113°36'08.19"E	ZAO	22°14.7'N	113°36.7'E

INSTRUMENT APPROACH CHART - ICAO

PROTECTED FOR A B C D CAT

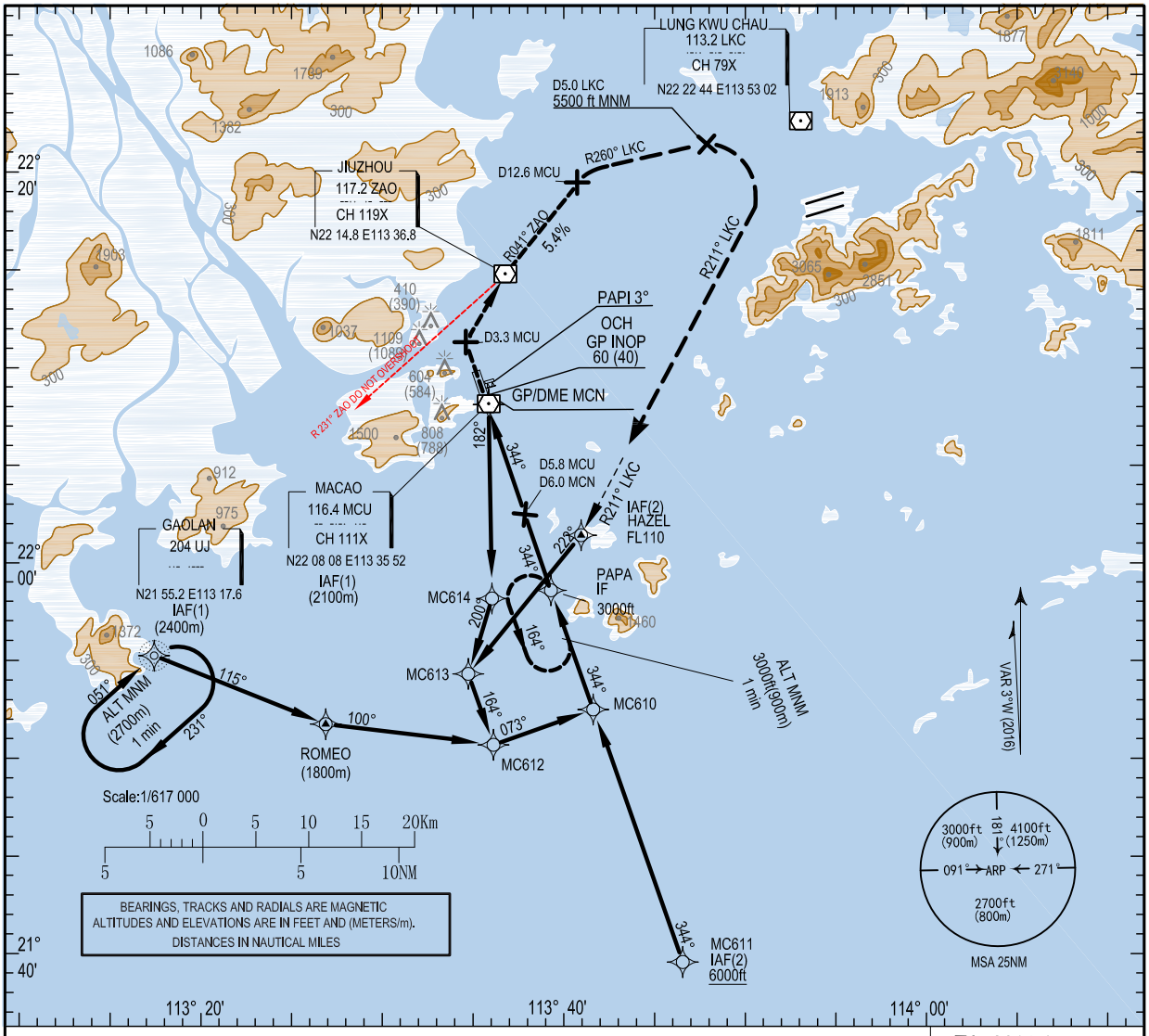
HEIGHTS RELATED TO AD. ELEV 20 (1 hPa)

ATIS MACAO : 126.4
APP : ZHUHAI Approach 120.35 (124.25) (1)
HONG KONG Radar 126.3 / 119.1(2)
TWR : MACAO Tower 118.0
MACAO Ground 121.725 / 121.975

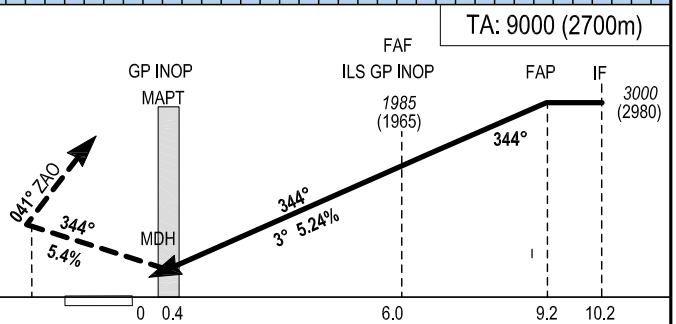
23 MAY 2019

AD 2 - VMMC - 69 D
ILS x RWY 34 RNAV(GNSS)

ILS
MCN 109.7
RDH: 54
MAX APCH TURNING SPEED : 190 kt IAS
MAX MISSED APCH TURNING SPEED : 185 kt IAS



MISSED APPROACH (2): (MNM climb gradient 5.4% required until passing 5500 ft) Climb on runway heading to 600 ft (183 m). At or before MCU 3.3 NM turn right (MAX IAS 185 kt) to ZAO, climbing to 1200 m (3937 ft). Leave ZAO on ZAO R041°. At MCU 12.6 NM turn right to intercept LKC R260°, continue climbing to 6000 ft (1829 m). At LKC 5.0 NM and altitude at or above 5500 ft turn right to establish on LKC R211° to HAZEL, descend to 3000 ft and proceed via MC613, MC612, MC610 to PAPA.
If ZAO is unserviceable, Climb on runway heading, at MCU 3.3 NM turn right (MAX IAS 185kt) on track 041°M. Then turn right by MCU 13.1 NM at altitude 1200m (3937ft) to intercept LKC VOR R260°, continue climbing to 6000ft (1829m) and continue the above procedure.



Standard MNM : vertical distances in feet, horizontal visibility in meters.

REF HEIGHT : ALT SDE.

CAT	ILS CAT I		ILS CAT II		GP INOP OCH : 286		CIRCLING		OCH CAT I	OCH CAT II
	DA(DH)	HV(RVR)	DA(DH)	RVR	MDH	HV	MDH	HV		
A	220(200)	800	120(100)	350	290	1200	SEE CHART AD 2 - VMMC - 72		A : 141	A : 49
B	220(200)	800	120(100)	350	290	1200			B : 150	B : 62
C	220(200)	800	120(100)	350	290	1200			C : 164	C : 76
D	220(200)	800	120(100)	350	290	1600			D : 171	D : 89

GP/DME MCN							
NM	7	6	5	4	3	2	1
ALT	2303	1985	1666	1348	1029	711	392
(HEIGHT)	(2283)	(1965)	(1646)	(1328)	(1009)	(691)	(372)

Remarks : (3)OCH ILS CAT I (CAT A, B, C, D) AND CAT II (CAT D) - CAT II (CAT A, B, C) ground plane. (4)MCN/DME is provided from the displaced threshold

FAF - Displaced THR	6.0 NM	70 kt	85 kt	100 kt	115 kt	130 kt	160 kt	185 kt
		5 min 09	4 min 14	3 min 36	3 min 08	2 min 46	2 min 15	1 min 57

FMC Database Coding Reference for ILS x RWY 34

Seq. Nr.	Path Terminator	Waypoint	FAF MAP	Fly-over	Track °M (°T)	Distance (NM)	Turn Dir	Altitude (ft)	Speed (knot)	VPA/ TCH	Navigation Specification
001	IF	MCU	—	—	—	—	—	6900	—	—	RNP APCH
002	TF	MC614	—	—	182(179)	9.9	—	—	—	—	RNP APCH
003	TF	MC613	—	—	200(197)	4.0	—	—	—	—	RNP APCH
004	TF	MC612	—	—	164(161)	3.8	—	—	—	—	RNP APCH
005	TF	MC610	—	—	073(070)	5.4	—	—	—	—	RNP APCH
006	TF	PAPA	—	—	344(341)	6.5	—	3000	-190	—	RNP APCH
001	IF	MC611	—	—	—	—	—	+6000	—	—	RNP APCH
002	TF	MC610	—	—	344(341)	13.7	—	—	—	—	RNP APCH
003	TF	PAPA	—	—	344(341)	6.5	—	3000	-190	—	RNP APCH
001	IF	UJ	—	—	—	—	—	7900	—	—	RNP APCH
002	TF	ROMEO	—	—	115(112)	9.4	—	5900	—	—	RNP APCH
003	TF	MC612	—	—	100(097)	8.6	—	—	—		RNP APCH
004	TF	MC610	—	—	073(070)	5.4	—	—	—	—	RNP APCH
005	TF	PAPA	—	—	344(341)	6.5	—	3000	-190	—	RNP APCH
001	IF	HAZEL	—	—	—	—	—	11000	—	—	RNP APCH
002	TF	MC613	—	—	222(219)	9.1	—	—	—	—	RNP APCH
003	TF	MC612	—	—	164(161)	3.8	—	—	—	—	RNP APCH
004	TF	MC610	—	—	073(070)	5.4	—	—	—	—	RNP APCH
005	TF	PAPA	—	—	344(341)	6.5	—	3000	-190	—	RNP APCH

Waypoint Coordinates

Waypoint Name	Coordinates (WGS84)	
HAZEL	22°01'26.49"N	113°40'56.63"E
LATOP	22°16.9'N	113°38.6'E
MC610	21°52'31.46"N	113°41'36.15"E
MC611	21°39'36.00"N	113°46'30.00"E
MC612	21°50'42.92"N	113°36'08.19"E
MC613	21°54'20.84"N	113°34'45.32"E
MC614	21°58'12.27"N	113°36'03.19"E
MC615	22°18'12.10"N	113°50'26.77"E
MCU	22°08'08"N	113°35'52"E
PAPA	21°58'39"N	113°39'22"E
ROMEO	21°51.8'N	113°26.9'E
UJ	21°55.2'N	113°17.6'E

INSTRUMENT APPROACH CHART - ICAO

HEIGHTS RELATED TO AD. ELEV 20 (1 hPa)

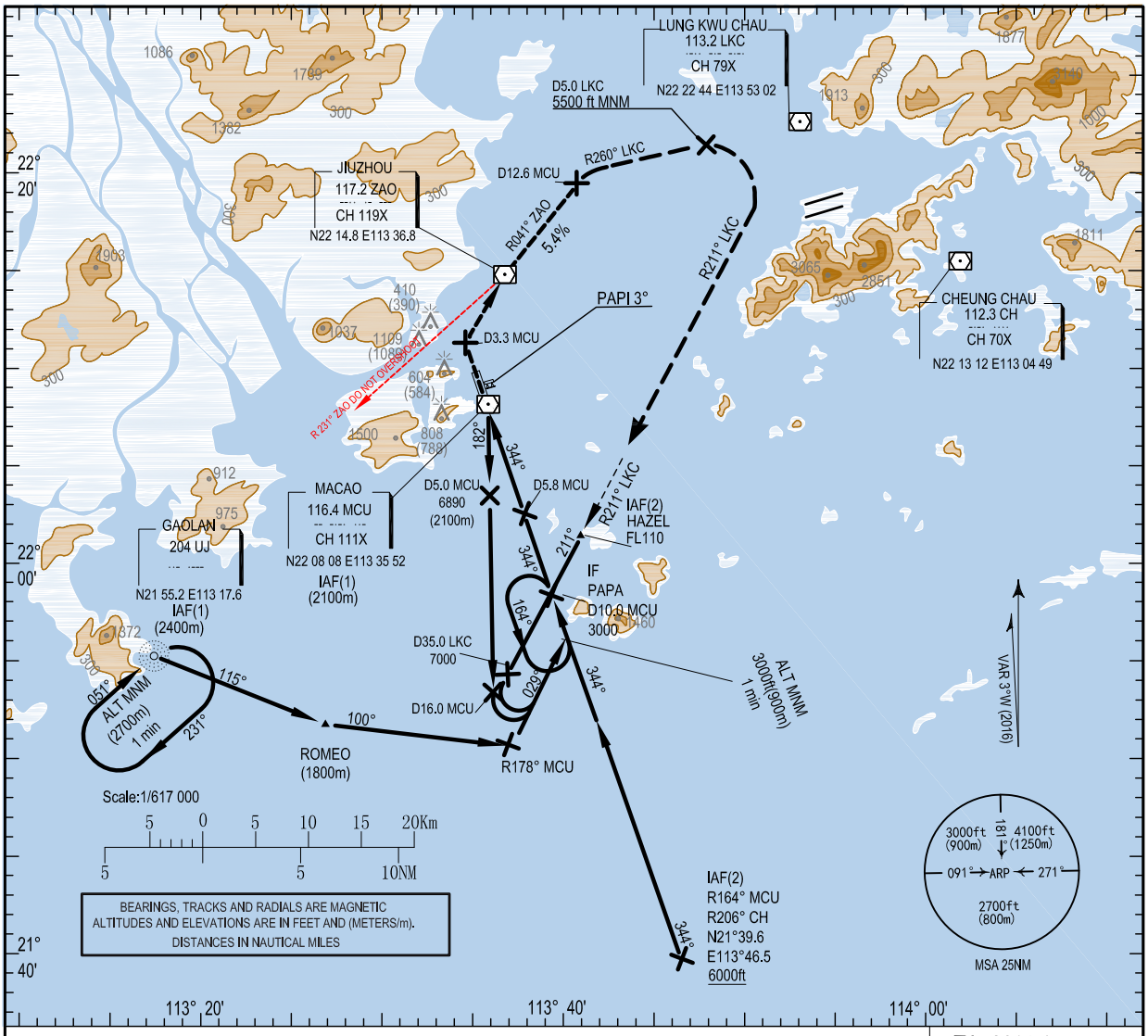
ATIS MACAO : 126.4
APP : ZHUHAI Approach 120.35 (124.25) (1)
HONG KONG Radar 126.3 / 119.1(2)
TWR : MACAO Tower 118.0
MACAO Ground 121.725 / 121.975

AD 2 - VMMC - 70
VOR/DME RWY 34

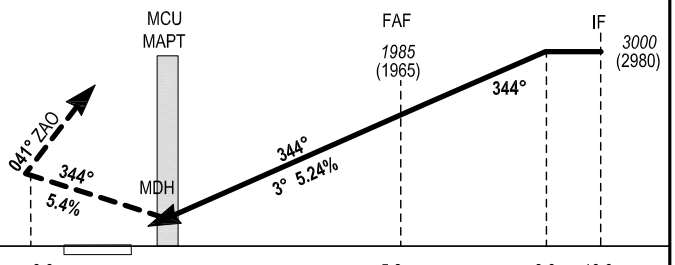
PROTECTED FOR A B C D CAT

23 MAY 2019

MAX APCH TURNING SPEED : 190 kt IAS
MAX MISSED APCH TURNING SPEED : 185 kt IAS



MISSED APPROACH (2) : (MNM climb gradient 5.4% required until passing 5500 ft)Climb on runway heading to 600 ft (183 m). At or before MCU 3.3 NM turn right (MAX IAS 185 kt) to ZAO, climbing to 1200 m (3937 ft). Leave ZAO on ZAO R041°. At MCU 12.6 NM turn right to intercept LKC R260°, continue climbing to 6000 ft (1829 m). At LKC 5.0 NM and altitude at or above 5500 ft turn right to establish on LKC R211° and at LKC 35.0 NM descend to 3000 ft and turn left on track 029°M to intercept Macau RWY 34 final approach track,
or expect radar vectoring by Hong Kong ATC via the most expeditious means to Macau RWY 34 final approach.
If ZAO is unserviceable, Climb on runway heading, at MCU 3.3 NM turn right (MAX IAS 185kt) on track 041°M. Then turn right by MCU 13.1 NM at altitude 1200m (3937ft) to intercept LKC VOR R260°, continue climbing to 6000ft (1829m) and continue the above procedure.



VOR/DME ← (NM)

Standard MNM : vertical distances in feet, horizontal visibility in meters.

REF HEIGHT : ALT AD

CAT	VOR/DME OCH : 522		CIRCLING	
	MDH	HV	MDH	HV
A	530	2000	SEE CHART AD 2 - VMMC - 72	
B	530	2000		
C	530	2400		
D	530	3200		

VOR/DME MCU						
NM	7	6	5	4	3	2
ALT	2362	2044	1725	1407	1088	770
(HEIGHT)	(2342)	(2024)	(1705)	(1387)	(1068)	(750)

FAF - Displaced THR	5.8 NM	70 kt	85 kt	100 kt	115 kt	130 kt	160 kt	185 kt
		4 min 58	4 min 06	3 min 29	3 min 02	2 min 41	2 min 11	1 min 53

INTENTIONALLY

LEFT

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INSTRUMENT APPROACH CHART - ICAO

HEIGHTS RELATED TO AD. ELEV *20 (1 hPa)*

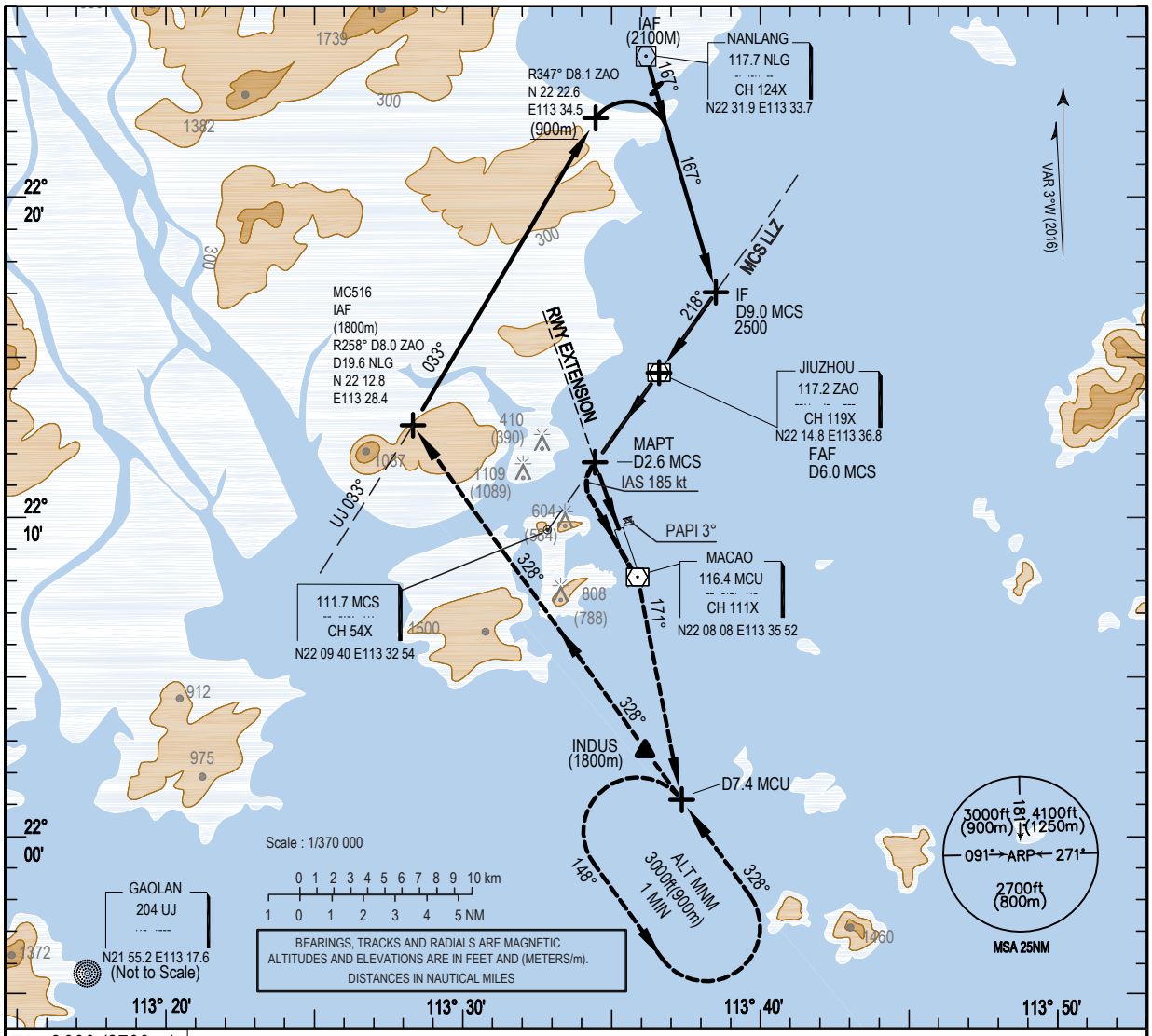
ATIS MACAO : 126.4
APP : ZHUHAI Approach 120.35 (124.25) (1)
HONG KONG Radar 126.3 / 119.1(2)
TWR : MACAO Tower 118.0
MACAO Ground 121.725 / 121.975

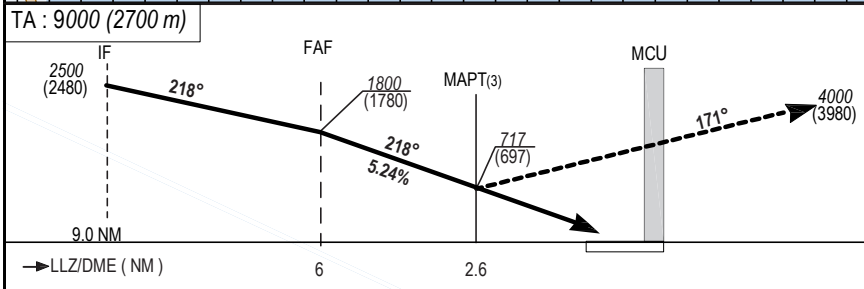
AD 2 - VMMC - 71
LLZ/DME z RWY 16
LLZ
MCS 111.7

PROTECTED FOR A B C D CAT

04 JAN 2018

MAX APCH TURNING SPEED : 190 kt IAS
MAX MISSED APCH TURNING SPEED : 185 kt IAS





MISSED APPROACH (1)
(MNM climb gradient 3.3% required until D7.4 MCU) Climb on MCU R344° to 4000 ft (1200 m). At MCU VOR track outbound on R171° to DME 7.4 and expect radar vectoring from Hong Kong Radar to cross INDUS at 1800 m. Leave INDUS on 328°M to MC516 at 1800 m.

Standard MNM : vertical distances in feet, horizontal visibility in meters.

REF HEIGHT : *ALT AD.*

CAT	LLZ OCH : 700		CIRCLING	
	MDH	HV	MDH	HV
A	700	3600	Not Applicable	
B	700	3600		
C	700	3600		
D	700	3600		

LLZ/DME MCS				
NM	6	5	4	3
ALT	*1800*	*1482*	*1163*	*845*
(HEIGHT)	(1780)	(1462)	(1143)	(825)

(3) The approach final segment is offset from landing direction by 054°
On the approach final segment, and at pilot discretion, a visual left turn should be initiated in time to allow lining up with the runway, considering the aircraft type, approach speed....
before the MAPT.
At MAPT (2.6 NM LLZ/DME), even visual, the missed approach procedure is mandatory.

FAF - MAPT	3.4 NM	70 kt	85 kt	100 kt	115 kt	130 kt	160 kt	185 kt
		2 min 55	2 min 24	2 min 03	1 min 47	1 min 34	1 min 17	1 min 06

INTENTIONALLY

LEFT

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INSTRUMENT APPROACH CHART - ICAO

PROTECTED FOR A B C D CAT

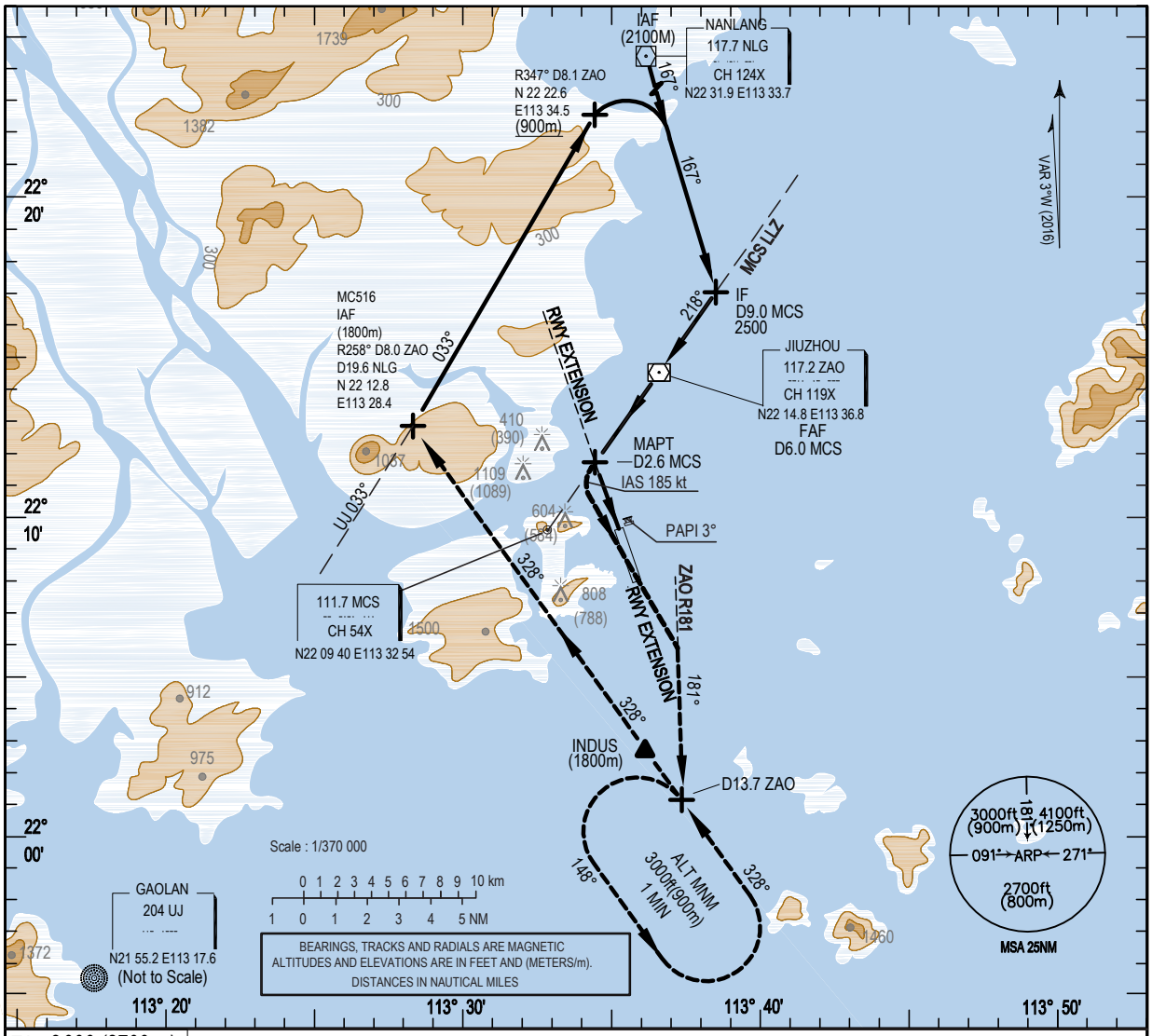
HEIGHTS RELATED TO AD. ELEV *20 (1 hPa)*

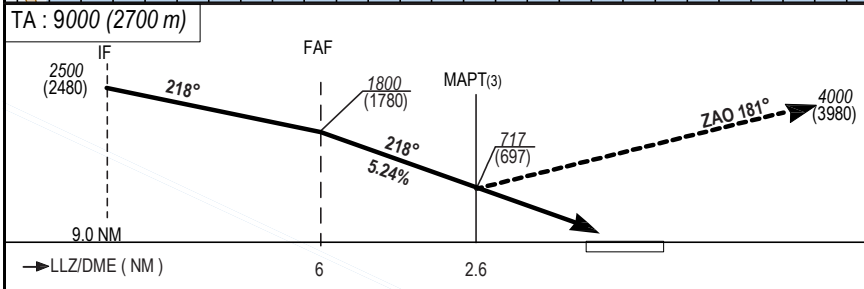
ATIS MACAO : 126.4
APP : ZHUHAI Approach 120.35 (124.25) (1)
HONG KONG Radar 126.3 / 119.1(2)
TWR : MACAO Tower 118.0
MACAO Ground 121.725 / 121.975

04 JAN 2018

AD 2 - VMMC - 71A
LLZ/DME y RWY 16
(MCU Unserviceable)

LLZ
MCS 111.7
MAX APCH TURNING SPEED : 190 kt IAS
MAX MISSED APCH TURNING SPEED : 185 kt IAS





MISSED APPROACH (1)
(MNM climb gradient 3.3% required until D13.7 ZAO) Turn left and climb to 4000 ft on ZAO R181 and expect radar vectoring from HK Radar to INDUS at 1800 m. Leave INDUS on 328°M to MC516 at 1800 m or as directed by ATC.

Standard MNM : vertical distances in feet, horizontal visibility in meters.

REF HEIGHT : *ALT AD.*

CAT	LLZ OCH : 700 MDH	LLZ OCH : 700 HV	CIRCLING MDH	CIRCLING HV
A	700	3600	Not Applicable	
B	700	3600		
C	700	3600		
D	700	3600		

LLZ/DME MCS				
NM	6	5	4	3
ALT	*1800*	*1482*	*1163*	*845*
(HEIGHT)	(1780)	(1462)	(1143)	(825)

(3) The approach final segment is offset from landing direction by 054°
On the approach final segment, and at pilot discretion, a visual left turn should be initiated in time to allow lining up with the runway, considering the aircraft type, approach speed....
before the MAPT.
At MAPT (2.6 NM LLZ/DME), even visual, the missed approach procedure is mandatory.

FAF - MAPT	3.4 NM	70 kt	85 kt	100 kt	115 kt	130 kt	160 kt	185 kt
		2 min 55	2 min 24	2 min 03	1 min 47	1 min 34	1 min 17	1 min 06

INTENTIONALLY

LEFT

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INSTRUMENT APPROACH CHART - ICAO

HEIGHTS RELATED TO AD. ELEV *20 (1 hPa)*

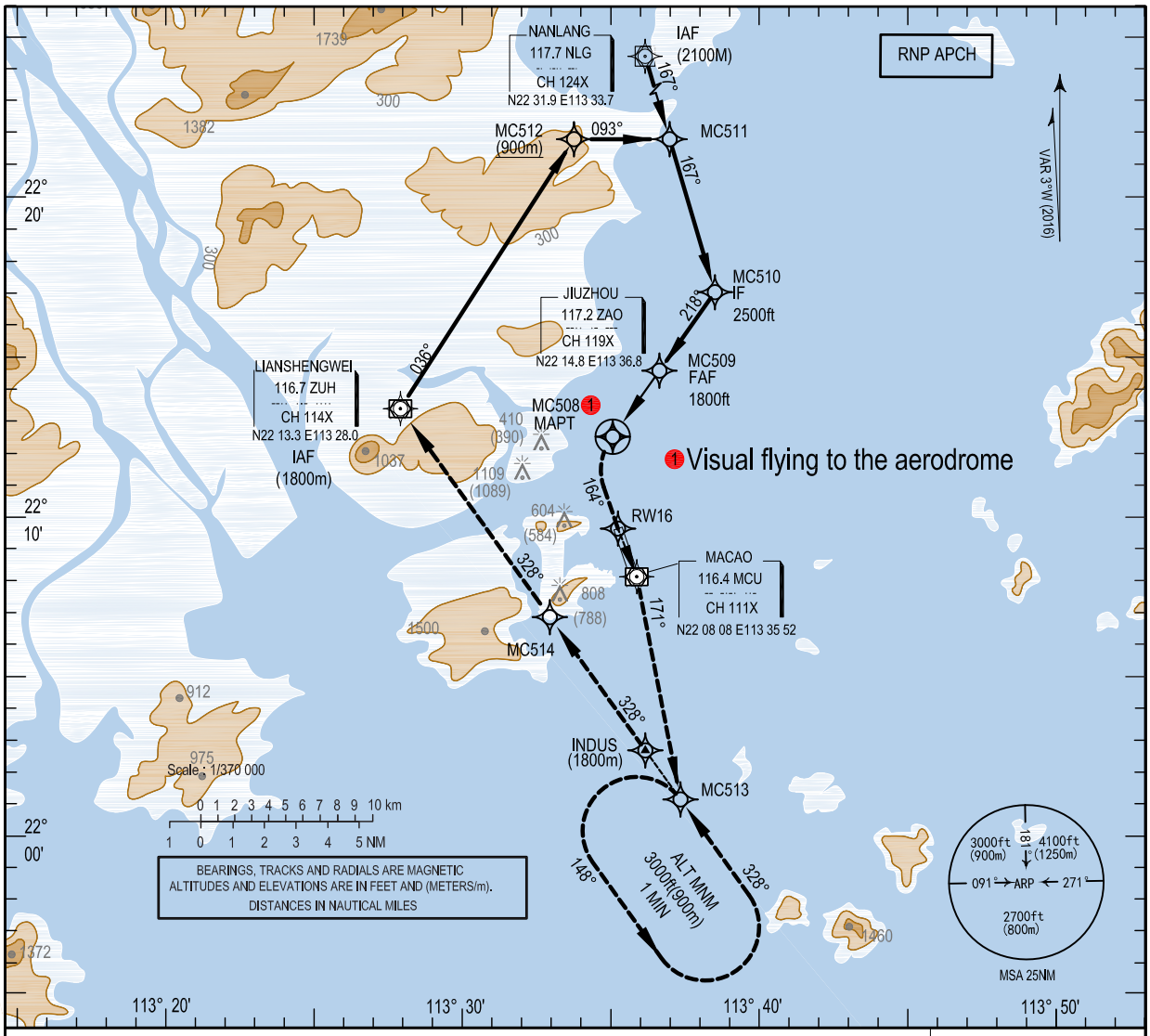
ATIS MACAO : 126.4
APP : ZHUHAI Approach 120.35 (124.25) (1)
HONG KONG Radar 126.3 / 119.1(2)
TWR : MACAO Tower 118.0
MACAO Ground 121.725 / 121.975

AD 2 - VMMC - 71 B
RNP y RWY 16 (LNAV only)

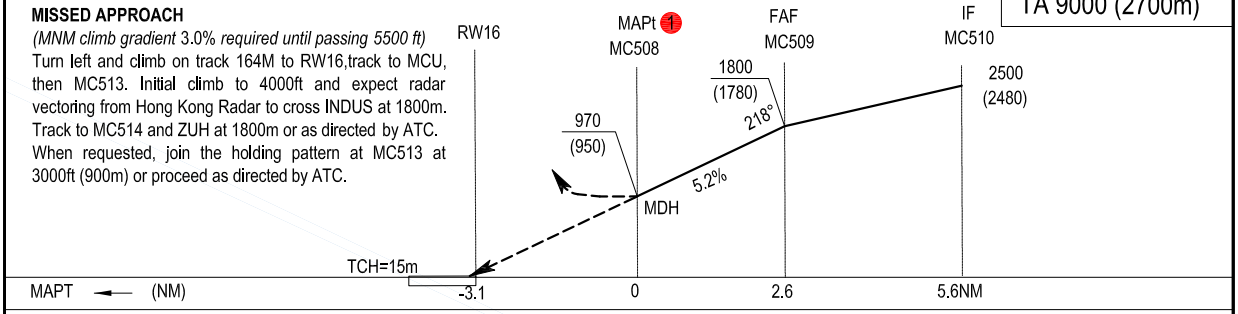
PROTECTED FOR A B C D CAT

23 MAY 2019

Only for LNAV
MAX APCH TURNING SPEED : 190 kt IAS
MAX MISSED APCH TURNING SPEED : 185 kt IAS



MISSED APPROACH
(MNM climb gradient 3.0% required until passing 5500 ft)
Turn left and climb on track 164M to RW16,track to MCU, then MC513. Initial climb to 4000ft and expect radar vectoring from Hong Kong Radar to cross INDUS at 1800m. Track to MC514 and ZUH at 1800m or as directed by ATC. When requested, join the holding pattern at MC513 at 3000ft (900m) or proceed as directed by ATC.



Standard MNM:vertical distances in feet,horizontal visibility in meters.

CAT	LNAV		CIRCLING	
	MDA/MDH	HV	MDA/MDH	HV
A	970/950	5000	Not Applicable	
B	970/950	5000		
C	970/950	5000		
D	970/950	5000		

MAPT(MC508)

NM	2	1
ALT	1602	1283
(HEIGHT)	(1582)	(1263)

1 On the approach final segment,and at pilot discretion,a visual left turn should be initiated in time to allow lining up with the runway, considering the aircraft type, approach speed before the MAPT. At MAPT(MC508),even visual, the missed approach procedure is mandatory.

FAF-MAPT 2.6NM	70kt	85kt	100kt	115kt	130kt	145kt	160kt	185kt
	2 min 14	1 min 50	1 min 34	1 min 21	1 min 12	1 min 05	0 min 59	0 min 51

FMC Database Coding Reference for RNP y RWY16 APCH

Sequence Number	Path Terminator	Waypoint	FAF MAP	Fly-over	Track °M (°T)	Distance (NM)	Turn Dir	Altitude (ft)	Speed (knot)	VPA/ TCH	Navigation Specification
001	IF	MC510	—	—	—	—	—	2500	-190	—	RNP APCH
002	TF	MC509	F	—	218(215)	3.0	—	1800	-190	3.00	RNP APCH
003	TF	MC508	M	Y	218(215)	2.524	—	1000	-185	3.00	RNP APCH
004	CF	RW16	—	—	164(160)	3.16	—	—	-185	—	RNP APCH
005	TF	MCU	—	—	162(159)	1.61	—	—	-185	—	RNP APCH
006	TF	MC513	—	—	171(168)	7.1	—	—	-185	—	RNP APCH
007	HM	MC513	—	Y	328(325)	—	L	3000	-185	—	RNP APCH
008	TF	INDUS	-	-	328(325)	-	-	5900	-	-	RNP APCH
009	TF	MC514	-	-	328(325)	-	-	5900	-	-	RNP APCH
010	TF	ZUH	-	-	328(325)	-	-	5900	-	-	RNP APCH
001	IF	ZUH	—	—	—	—	—	5900	—	—	RNP APCH
002	TF	MC512	—	—	036(033)	10.0	—	+3000	-190	—	RNP APCH
003	TF	MC511	—	—	093(090)	3.0	—	—	-190	—	RNP APCH
004	TF	MC510	—	—	167(164)	5.0	—	2500	-190	—	RNP APCH
001	IF	NLG	—	—	—	—		6900		—	RNP APCH
002	TF	MC511	—	—	167(164)	10.4	—	—	—	—	RNP APCH
003	TF	MC510	—	—	167(164)	5.0	—	2500	-190	—	RNP APCH

Waypoint Coordinates

Waypoint Name	Coordinates (WGS84)	
INDUS	22°02′41.0″N	113°36′01.0″E
MC508	22°12′25.79″N	113°34′59.76″E
MC509	22°14′34.78″N	113°36′37.67″E
MC510	22°17′02.13″N	113°38′29.61″E
MC511	22°21′49.23″N	113°36′58.39″E
MC512	22°21′49.25″N	113°33′45.41″E
MC513	22°01′09.95″N	113°37′20.04″E
MC514	22°06′52.19″N	113°32′56.82″E
MCU	22°08′08″N	113°35′52″E
NLG	22°31.9′N	113°33.7′E
RW16	22°09′38.31″N	113°35′14.14″E
ZUH	22°13.3′N	113°28.0′E

INSTRUMENT APPROACH CHART - ICAO

HEIGHTS RELATED TO AD. ELEV *20 (1 hPa)*

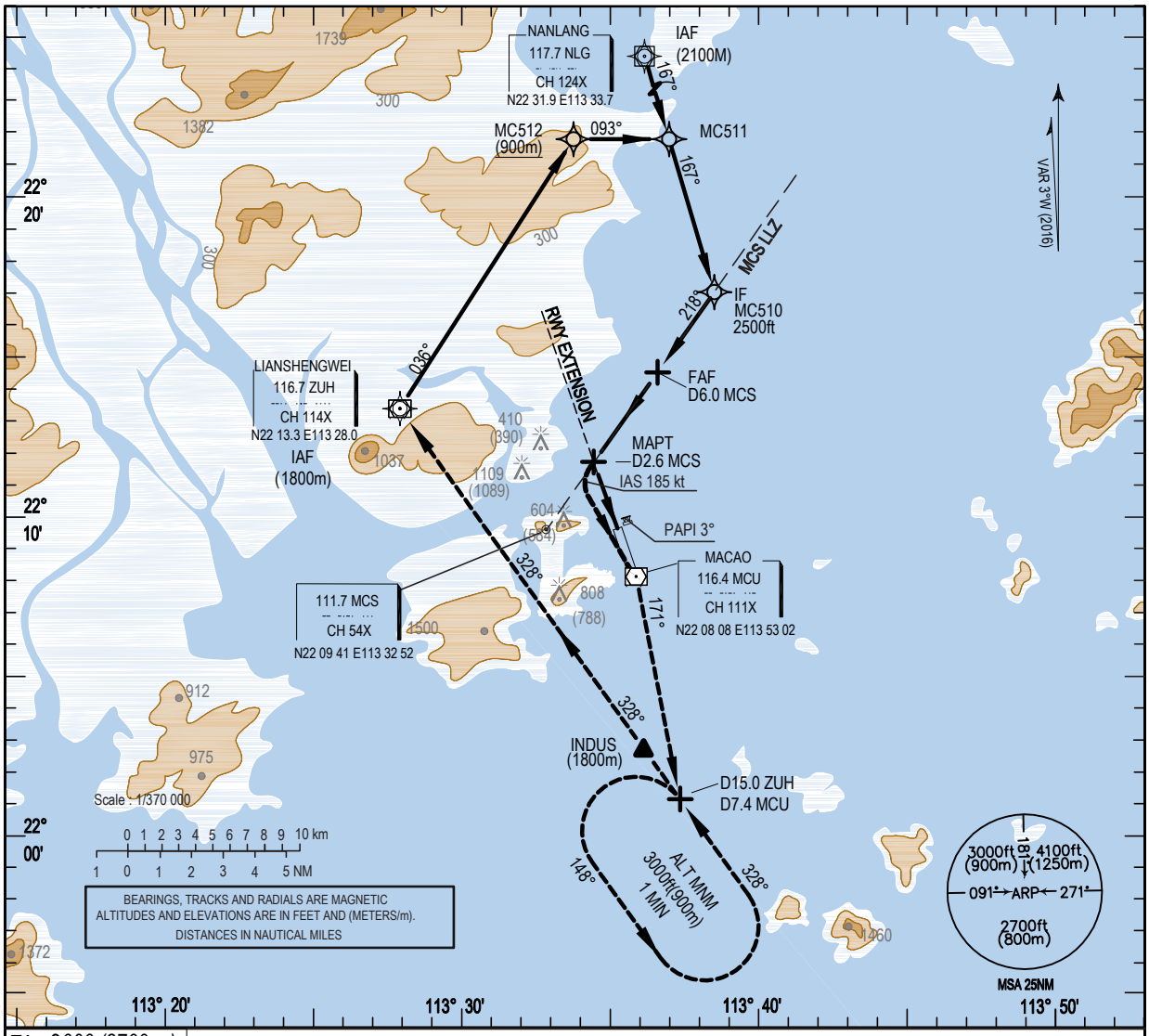
ATIS MACAO : 126.4
APP : ZHUHAI Approach 120.35 (124.25) (1)
HONG KONG Radar 126.3 / 119.1(2)
TWR : MACAO Tower 118.0
MACAO Ground 121.725 / 121.975

AD 2 - VMMC - 71 D
LLZ/DME x RWY 16
RNAV(GNSS)

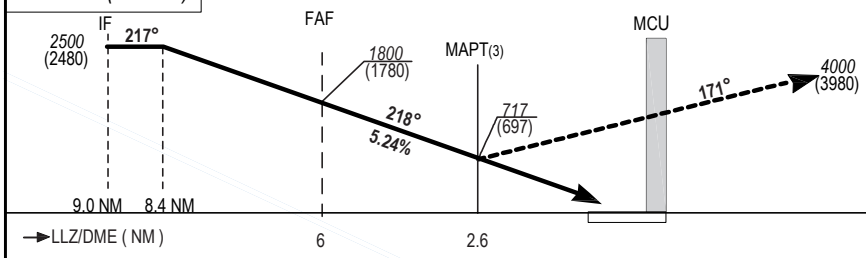
PROTECTED FOR A B C D CAT

04 JAN 2018

MAX APCH TURNING SPEED : 190 kt IAS
MAX MISSED APCH TURNING SPEED : 185 kt IAS



TA : *9000 (2700 m)*



MISSED APPROACH (1)
Climb on MCU R344° to 4000 ft (1200 m). At MCU VOR track outbound on R171° to DME 7.4 (ZUH VOR R148° DME 15.0) and expect radar vectoring from Hong Kong Radar to cross INDUS at 1800 m to establish on ZUH R148° and cross ZUH VOR at 1800 m or as directed by ATC.
When required, join the holding pattern at MCU R171°/DME 7.4 (ZUH R148°/DME 15.0) or proceed as directed by ATC.

Standard MNM : vertical distances in feet, horizontal visibility in meters.

REF HEIGHT : *ALT AD.*

CAT	LLZ OCH : 700		CIRCLING	
	MDH	HV	MDH	HV
A	700	3600	Not Applicable	
B	700	3600		
C	700	3600		
D	700	3600		

LLZ/DME MCS

NM	6	5	4	3
ALT	*1800*	*1482*	*1163*	*845*
(HEIGHT)	(1780)	(1462)	(1143)	(825)

(3) The approach final segment is offset from landing direction by 054°
On the approach final segment, and at pilot discretion, a visual left turn should be initiated in time to allow lining up with the runway, considering the aircraft type, approach speed....
before the MAPT.
At MAPT (2.6 NM LLZ/DME), even visual, the missed approach procedure is mandatory.

FAF - MAPT	3.4 NM	70 kt	85 kt	100 kt	115 kt	130 kt	160 kt	185 kt
		2 min 55	2 min 24	2 min 03	1 min 47	1 min 34	1 min 17	1 min 06

FMC Database Coding Reference for LLZ/DME x RWY 16 APCH

Sequence Number	Path Terminator	Waypoint	FAF MAP	Fly-over	Track °M (°T)	Distance (NM)	Turn Dir	Altitude (ft)	Speed (knot)	VPA/ TCH	Navigation Specification
001	IF	ZUH	—	—	—	—	—	5900	—	—	RNP APCH
002	TF	MC512	—	—	036(033)	10.0	—	+3000	-190	—	RNP APCH
003	TF	MC511	—	—	093(090)	3.0	—	—	-190	—	RNP APCH
004	TF	MC510	—	—	167(164)	5.0	—	2500	-190	—	RNP APCH
001	IF	NLG	—	—	—	—		6900		—	RNP APCH
002	TF	MC511	—	—	167(164)	10.4	—	—	—	—	RNP APCH
003	TF	MC510	—	—	167(164)	5.0	—	2500	-190	—	RNP APCH

Waypoint Coordinates

Waypoint Name	Coordinates (WGS84)	
INDUS	22°02′41.0″N	113°36′01.0″E
MC510	22°17′02.13″N	113°38′29.61″E
MC511	22°21′49.23″N	113°36′58.39″E
MC512	22°21′49.25″N	113°33′45.41″E
MCU	22°08′08″N	113°35′52″E
NLG	22°31.9′N	113°33.7′E
ZUH	22°13.3′N	113°28.0′E

INSTRUMENT APPROACH CHART - ICAO

PROTECTED FOR A B C D CAT

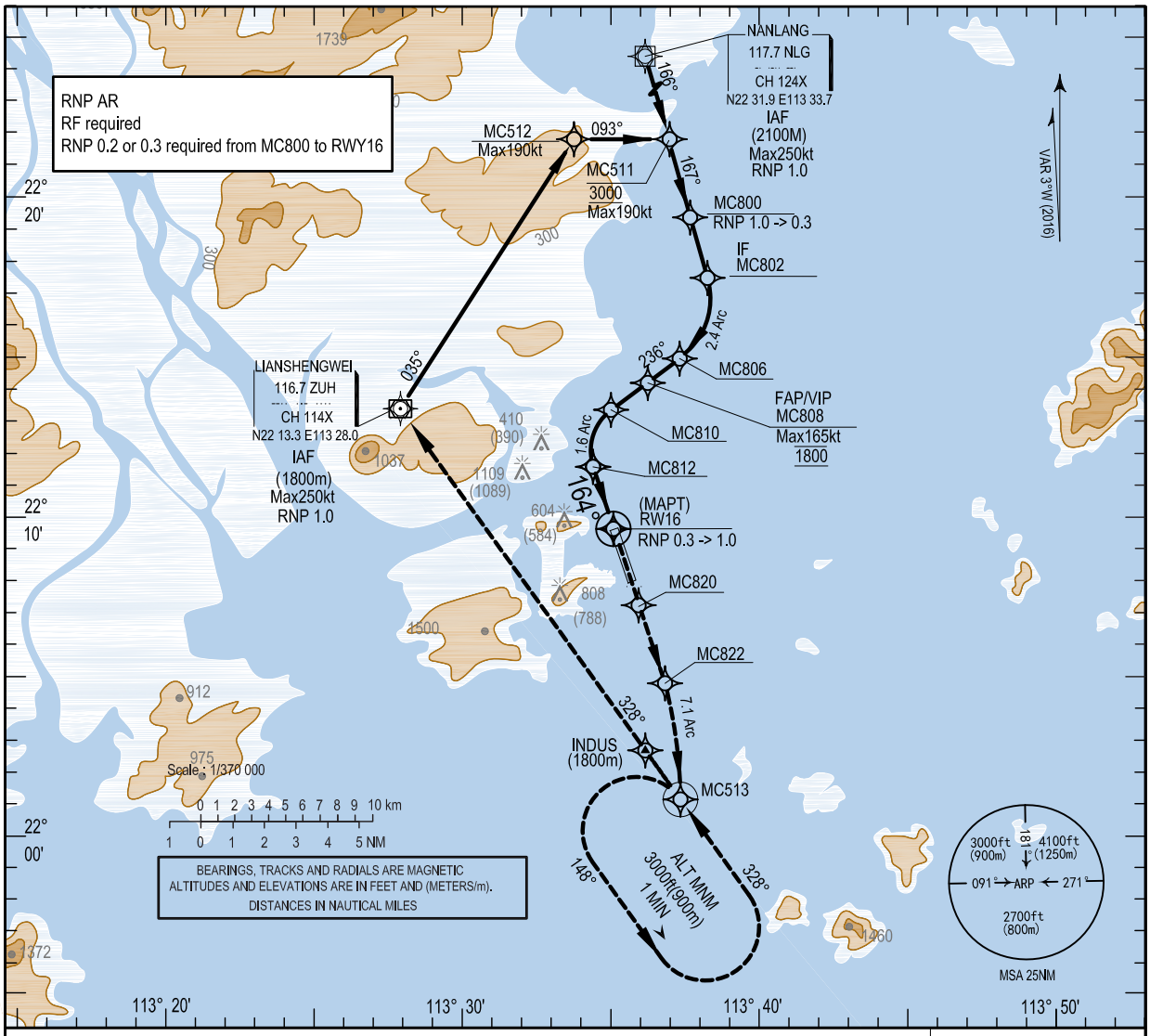
HEIGHTS RELATED TO AD. ELEV *20 (1 hPa)*

ATIS MACAO : 126.4
APP : ZHUHAI Approach 120.35 (124.25) (1)
HONG KONG Radar 126.3 / 119.1(2)
TWR : MACAO Tower 118.0
MACAO Ground 121.725 / 121.975

23 MAY 2019

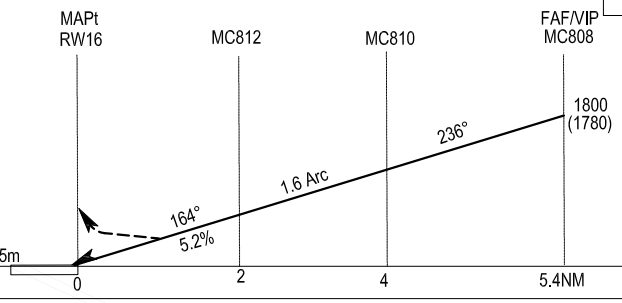
AD 2 - VMMC - 71F
RNP z RWY 16 (AR)

Authorization required
TEMP RESTRICTION
MIN Temp 5°C



TA 9000 (2700m)

MISSED APPROACH
Climb to 4000 ft (1200 m) via the missed approach track to MC513 and expect radar vectoring from Hong Kong ATC to cross INDUS at 5900 ft (1800 m).Track to ZUH at 5900 ft (1800 m) or as directed by ATC. When requested, join the holding pattern at MC513 at 3000 ft (900 m) or proceed as directed by ATC.



Standard MNM:vertical distances in feet,horizontal visibility in meters.

CAT	RNP 0.2 ⓐ		RNP 0.2 ⓑ		RNP 0.3 ⓐ		RNP 0.3 ⓑ	
	OCA/OCH	HV	OCA/OCH	HV	OCA/OCH	HV	OCA/OCH	HV
A	270/250	900	270/250	900	300/280	1100	310/290	1100
B	270/250	900	270/250	900	310/290	1100	330/310	1300
C	270/250	900	280/260	1000	330/310	1300	350/330	1400
D	280/260	1000	300/280	1100	350/330	1400	370/350	1500

Note: RNP (LNAV/VNAV).
ⓐ 3.0% MNM Climb Gradient.
ⓑ 2.5% MNM Climb Gradient.

FMC Database Coding Reference for RNP z RWY 16 (AR) APCH

Seq. Nr.	Path Terminator	Waypoint	Fix Role	Fly-over	Track °M (°T)	Distance (NM)	Turn Dir	Altitude (ft)	Speed (knot)	VPA/ TCH	Navigation Specification
001	IF	NLG	IAF	—	—	—	—	+6900	-250	—	RNP AR APCH
002	TF	MC511	—	—	166(163)	10.492	—	+3000	-190	—	RNP AR APCH
003	TF	MC800	—	—	167(164)	2.500	—	—	—	—	RNP AR APCH
004	TF	MC802	—	—	167(164)	1.968	—	—	—	—	RNP AR APCH
005	RF Centre: MCC80 r = 2.360NM	MC806	—	—	236(233)	2.842	R	—	—	—	RNP AR APCH
006	TF	MC808	—	—	236(233)	1.252	—	1800	-165	—	RNP AR APCH
001	IF	ZUH	IAF	—	—		—	+5900	-250	—	RNP AR APCH
002	TF	MC512	—	—	035(032)	10.030	—	—	-190	—	RNP AR APCH
003	TF	MC511	—	—	093(090)	2.981	—	+3000	—	—	RNP AR APCH
004	TF	MC800	—	—	167(164)	2.500	—	—	—	—	RNP AR APCH
005	TF	MC802	—	—	167(164)	1.968	—	—	—	—	RNP AR APCH
006	RF Centre: MCC80 r = 2.360NM	MC806	—	—	236(233)	2.842	R	—	—	—	RNP AR APCH
007	TF	MC808	—	—	236(233)	1.252	—	1800	-165	—	RNP AR APCH
001	IF	MC808	FAF	—	—		—	1800	-165	—	RNP AR APCH
002	TF	MC810	—	—	236(233)	1.435	—	—	—	3.00	RNP AR APCH
003	RF Centre: MCC82 r = 1.600NM	MC812	—	—	164(161)	2.000	L	—	—	3.00	RNP AR APCH
004	TF	RW16	MAPT	Y	164(161)	2.000	—	+70	—	3.00	RNP AR APCH
005	TF	MC820	—	—	164(161)	2.559	—	—	—	—	RNP AR APCH
006	TF	MC822	—	—	164(161)	2.587	—	—	—	—	RNP AR APCH
007	RF Centre: MCC84 r = 7.179NM	MC513	—	—	193(190)	3.624	R	—	-185	—	RNP AR APCH
008	HM	MC513	—	Y	328(325)		L	+3000	-185	—	RNP AR APCH

Waypoint Coordinates

Waypoint Name	Coordinates (WGS84)		Waypoint Name	Coordinates (WGS84)	
NLG	22°31'54.0000"N	113°33'42.0000"E	MC808	22°14'12.4680"N	113°36'21.1390"E
ZUH	22°13'18.0000"N	113°28'00.0000"E	MC810	22°13'20.0870"N	113°35'07.3230"E
RW16	22°09'38.3100"N	113°35'14.1400"E	MC812	22°11'32.2130"N	113°34'32.1820"E
MC511	22°21'49.2300"N	113°36'58.3900"E	MC820	22°07'12.5500"N	113°36'07.8040"E
MC512	22°21'49.2500"N	113°33'45.4100"E	MC822	22°04'45.1840"N	113°37'02.0200"E
MC513	22°01'09.9500"N	113°37'20.0400"E			
MC800	22°19'24.7490"N	113°37'43.8130"E	MCC80	22°16'51.1470"N	113°35'53.0160"E
MC802	22°17'31.0330"N	113°38'19.5450"E	MCC82	22°12'03.4710"N	113°36'10.0330"E
MC806	22°14'58.1330"N	113°37'25.5250"E	MCC84	22°02'24.8370"N	113°29'43.4130"E

INSTRUMENT APPROACH CHART - ICAO

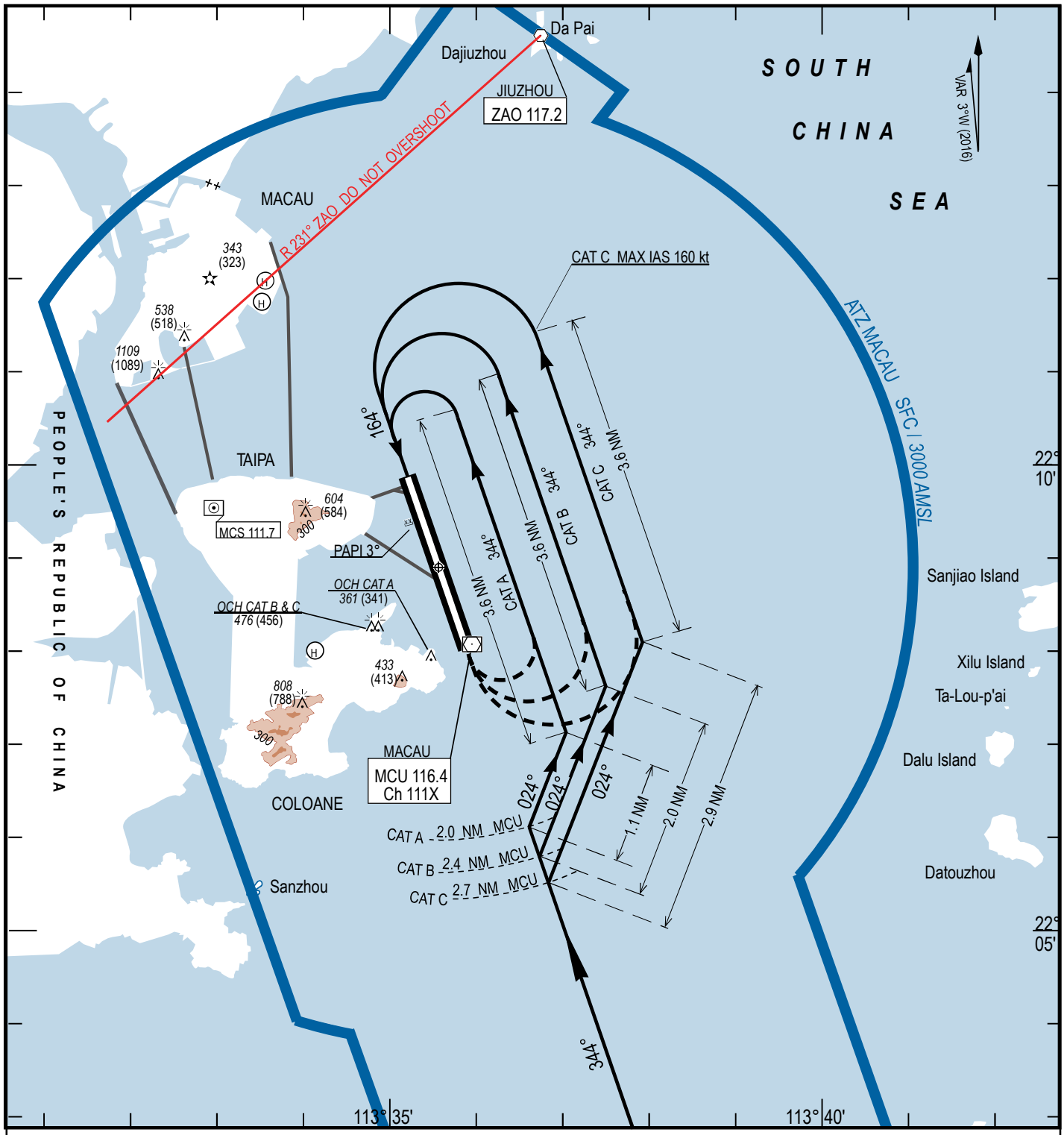
PROTECTED FOR A B C CAT

HEIGHTS RELATED TO AD. ELEV *20 (1 hPa)*

ATIS MACAU : 126.4
APP :ZHUHAI Approach 120.35 (124.25) (1)
HONG KONG Radar 126.3/ 119.1 (2)
TWR : MACAU Tower 118.0
MACAU Ground 121.725 121.975

04 JAN 2018

AD 2 - VMMC - 72
CIRCLING TO LAND RWY 16



Do not overshooting ZAO R231° which defines the northern limit for flights due to noise abatement for Zhuhai City

Standard MNM : vertical distances in feet, horizontal visibility in metres.

CAT	MAX. kt	After ILS, GP INOP or VOR/DME approach		
		MDA (MDH)	CEIL	HV
A	100	660 (640)	1500	6000
B	135	770 (750)	1500	6000
C	160	870 (850)	1500	6000

	Speed / Time						
Distance(NM)	100kt	110kt	120kt	130kt	140kt	150kt	160kt
1.1 (CAT A)	0 min 40						
2.0 (CAT B)	1 min 12	1 min 06	1 min 00	0 min 55			
2.9 (CAT C)	1 min 44	1 min 35	1 min 27	1 min 20	1 min 15	1 min 10	1 min 05
3.6 (CAT A,B,C)	2 min 10	1 min 58	1 min 48	1 min 40	1 min 33	1 min 26	1 min 21

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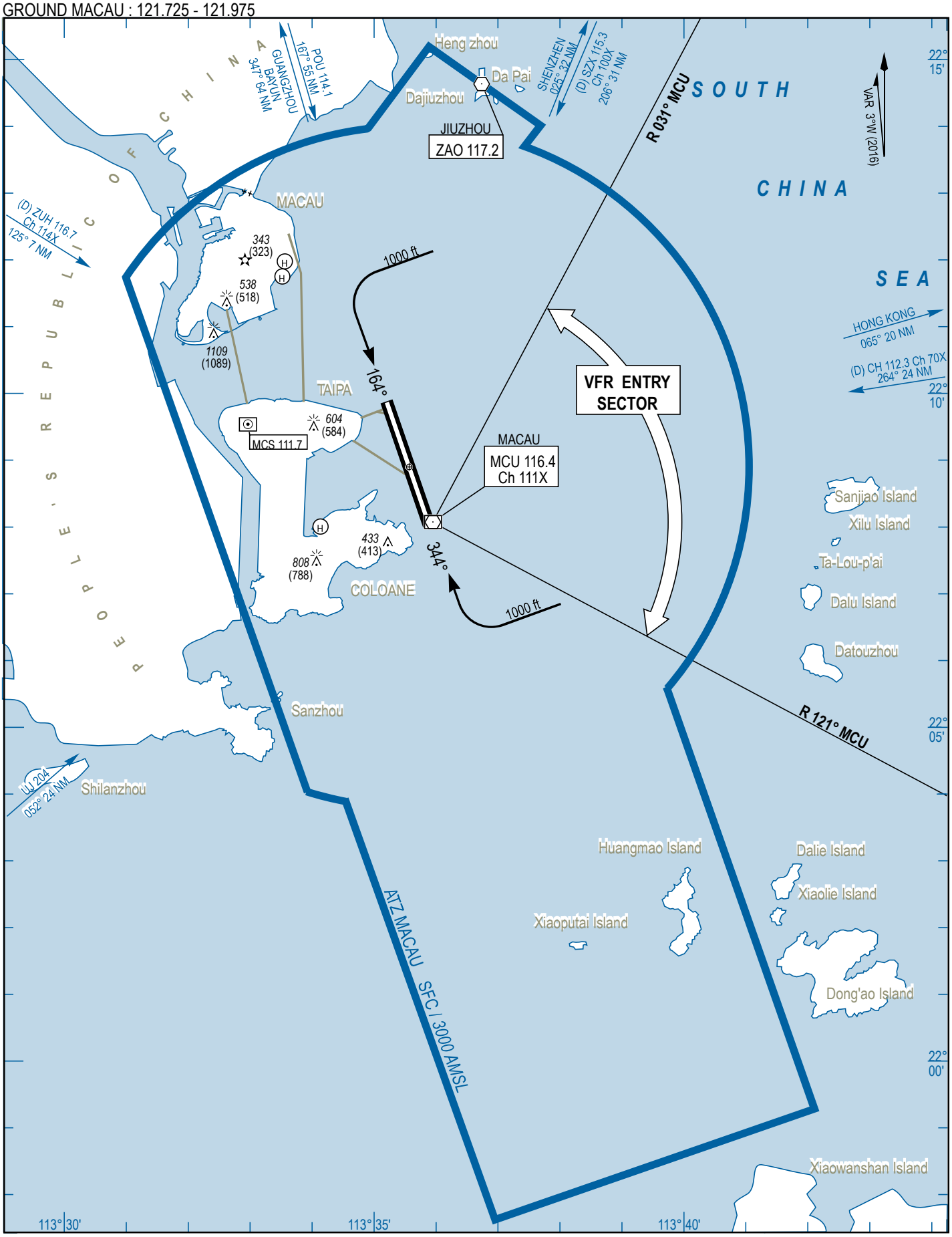
Bearings are magnetic
Altitudes and Elevations in Feet
AD ELEV : *20 (1hPa)*

LAT : 22° 08' 58" N
LONG : 113° 35' 29" E

ATIS MACAU : 126.4
TWR MACAU : 118.0
GROUND MACAU : 121.725 - 121.975



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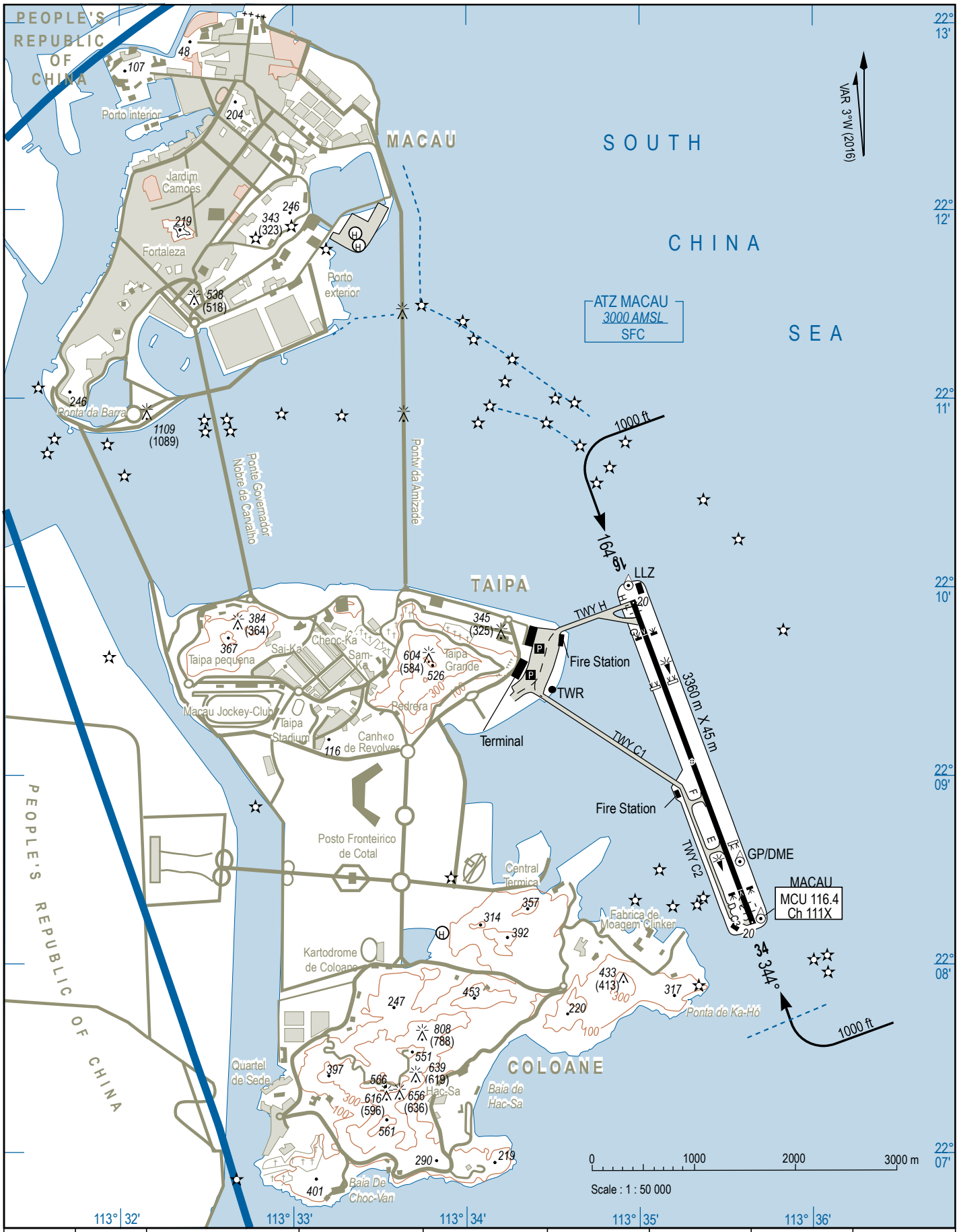

RWY	QFU	Dimension	Surface	Strength	TORA	TODA	ASDA	LDA
16	164°	3360 x 45	Concrete	PCN	3225	3285	3285	2865
34	344°	3360 x 45		63 / R / B / W / T	3300	3360	3360	2930

Lighting aids : RWY 16 : LIH - Threshold F LIH - Approach line W LIH - PAPI 3° (5.24%) MEHT 70 ft
RWY 34 : LIH - Threshold F LIH - Approach line W LIH - PAPI 3° (5.24%) MEHT 65 ft

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AD 3. HELIPORTS

AD 3.1 HELIPORT LOCATION INDICATOR AND NAME

MACAU Heliport

AD 3.2 HELIPORT GEOGRAPHICAL AND ADMINISTRATIVE DATA

1	Heliport reference point coordinates and site at heliport	22°11.80'N 113°33.55'E midpoint of the North helipad
2	Direction and distance from city	Eastern edge of Macau.
3	Elevation/Reference temperature	84 ft AMSL / 31.5° C
4	MAG VAR/Annual change	3°W (2016) / -
5	Heliport Administration, address, telephone, telefax, telex, AFS	Heliport Manager Macau Maritime Terminal Av. de Amizade, MACAU Tel : (853) 8893 5803 Telefax : (853) 8893 5801
6	Types of traffic permitted (IFR / VFR)	VFR / SVFR
7	Remarks	Heliport located on the top of the Macau Ferry Terminal.

AD 3.3 OPERATIONAL HOURS

1	Heliport Dispatch	08:00 to 23:30 local time
2	Customs and immigration	H24
3	Health and sanitation	NIL.
4	AIS Briefing Office	As Heliport Dispatch
5	ATS Reporting Office	As Heliport Dispatch
6	MET Briefing Office	As Heliport Dispatch
7	ATS	As Heliport Dispatch
8	Fuelling	As Heliport Dispatch
9	Handling	As Heliport Dispatch
10	Security	H24
11	De-icing	NIL.
12	Remarks	Self-briefing using Aviation Meteorological Information Dissemination System and telephone consultation with MIA

AD 3.4 HANDLING SERVICES AND FACILITIES

1	Cargo handling facilities	NIL.
2	Fuel / oil types	Fuel types : AVTUR JET A1 Oil types : NIL.
3	Fuelling facilities / capacity	20,000 Litres Jet A-1 total inc. 1,500 litre transfer tank
4	De-icing facilities	NIL.
5	Hangar space for visiting helicopter	As Heliport Dispatch
6	Repair facilities for visiting helicopter	As Heliport Dispatch
7	Remarks	NIL.

AD 3.6 PASSENGER FACILITIES

1	Hotels	In the City.
2	Restaurants	Within Macau Ferry Terminal and nearby in city.
3	Transportation	Courtesy Hotel buses, Public buses and taxis, plus ferries
4	Medical facilities	Nearby City Hospitals.
5	Bank and Post Office	Bank: Automatic Teller Machines in Macau Ferry Terminal. Post Office: In the city
6	Tourist Office	Within Macau Ferry Terminal
7	Remarks	NIL.

AD 3.6 RESCUE AND FIRE FIGHTING SERVICES

1	Heliport category for fire fighting	H2
2	Rescue equipment	Light facilities stored adjacent to the helideck
3	Capability for removal of disabled helicopter	FOCC will coordinate and arrange with Technical Engineer for services.
4	Remarks	Category H2 allows aircraft up to and including the size of Aerospatiale AS - 332L to use the Heliport on a regular basis

AD 3.7 SEASONAL AVAILABILITY - CLEARING

1	Types of clearing equipment	NIL.
2	Clearance priorities	NIL.
3	Remarks	NIL.

AD 3.8 APRONS, TAXIWAYS AND CHECK LOCATION DATA

1	Apron/helicopter stands surface and strength	Surface : synthetic surface Strength : 9 tones
2	Ground taxiway width, surface and Strength	Width : 55 m x 15 m Surface : synthetic surface Designation: NIL.
3	Air taxiway width and Strength	As ground taxiway
3	ACL location and elevation	NIL.
4	VOR/INS checkpoints	VOR: NIL. INS: NIL.
5	Remarks	NIL.

AD 3.9 MARKINGS AND MARKERS

1	Final approach and take-off markings	Edge of helipad, marked with a perimeter white line 300mm wide enclosing ‘H’
2	TWY, air TWY, air transit route markers	TWY centreline, TWY edge
3	Remarks	NIL.

AD 3.10 HELIPORT OBSTACLES

In approach/TKOF areas			At heliport		Remarks
1A			1B		
Area affected	Obstacle type Elevation Markings/LGT	Coordinates	Obstacle type Elevation Markings/LGT	Coordinates	
a	b	c	a	b	
03R/TKOF 21L/APCH			Decoration masts 8 m / 25 ft LGTD	21°11.8’N 113°33.55’E	NIL

AD 3.11 METEOROLOGICAL INFORMATION PROVIDED

1	Associated MET Office	Macau
2	Hours of service MET office outside hours	H24
3	Office responsible for TAF preparation Periods of validity	Macau
4	Type of landing forecasts Interval of issuance	TREND
5	Briefing/consultation provided	NIL.
6	Flight documentation Language used	Charts English
7	Charts and other information available for briefing or consultation	NIL.
8	Supplementary equipment available for providing information	Current temperature, wind direction and speed can be obtained from the meteorological equipment installed at the Macau Heliport .
9	ATS units provided with information	Macau TWR
10	Additional information (limitations of service etc.)	NIL.

AD 3.12 HELIPORT DATA

1	heliport type	Elevated
2	TLOF dimensions	Northern Helipad –17m x 17m Southern Helipad – 17m x 17m
3	FATO, GEO and MAG bearings	028° / 208° GEO 031° / 211° MAG
4	FATO dimensions and SFC type	Northern Helipad – 17m x 17m Synthetic Southern Helipad – 17m x 17m Synthetic
5	TLOF, SFC and BRG strength	synthetic, 9000 kg
6	Coordinates of geometric centre TLOF or THR of FATO	N22°11.80 E113°33.55 Midpoint of Northern Helipad N22°11.80 E113°33.60 Midpoint of Southern Helipad
7	TLOF / FATO, elevation and	elevation : 84 ft (25 m) MSL, slope : 0°
8	Safety area dimensions	34m x 34m. A 1.5m safety net extends outward from the edges of the helipad.

AD 3.13 DECLARED DISTANCES

	TODAH (m)	RTODAH (m)	LDAH (m)	Remarks
	1	2	3	4
FATO 03L	To be notified			
FATO 03R	To be notified			
FATO 21L	To be notified			
FATO 21R	To be notified			

AD 3.14 APPROACH AND FATO LIGHTING

1	APP LGT system type, LEN, INTST	NIL.
2	Type of visual approach slope indicator system	NIL.
3	FATO area LGT characteristics and location	White omnidirectional lights
4	Aiming point LGT characteristics and location	Yellow omnidirectional lights on “H”
5	TLOF LGT system characteristics and location	White flood light
6	Remarks	NIL..

AD 3.15 OTHER LIGHTING, SECONDARY POWER SUPPLY

1	Heliport BCN location and characteristics Hours of operation	South Eastern corner of Northern Helipad. Hours of operation: 08:00 to 23:00 local time
2	WDI location and LGT	South Eastern corner of Northern Helipad.
3	TWY edge and centre line lighting	Centre light
4	Secondary power supply/switch over time	Available / 2 secs
5	Remarks	NIL.

AD 3.16 ATS AIRSPACE

NIL.

AD 3.17 ATS COMMUNICATION FACILITIES

Service designation	Call sign	Frequency	Hours of operation	Remarks
1	2	3	4	5
TWR	MACAU TWR	118.000 MHz 121.500 MHz	H24	Emergency
FOCC	MACAU HELIPORT	123.500 MHz	0800 – 2330 LT	Company radio

AD 3.18 RADIO NAVIGATION AND LANDING AIDS

NIL.

AD 3.19 LOCAL TRAFFIC REGULATIONS

1. Airline operators shall obtain prior approval from AACM for each specific type of helicopter to be operated.

2. Single-engine helicopters are not permitted to operate from the helipad and all operators are required to comply with Category 'A' vertical takeoff and landing profile requirements with zero drop-down.

3. Helicopters are limited to overall length of 18.7m with rotor diameter of 15.6m and a maximum all up weight not exceeding 9,000kg.

4. The MH shall be closed and all operations will be ceased when typhoon signal No.8 is hoisted or if the wind condition prevents safe flight operations as determined by the SHM or as prescribed in the Flight Operations Manual of the aircraft operator.

5. Tie-down parking outside operating hours will be permitted only when approved by the SHM, provided that during such tie-down period, the premises must be suitably manned. Tie-down of the aircraft is the responsibility of the airline operator or its agent.

AD 3.20 NOISE ABATEMENT PROCEDURES

To be developed

AD 3.21 FLIGHT PROCEDURES

1. Traffic circuit

1.1. Depending on the wind direction, the helicopter can make a final approach to the pad on tracks 211 or 031°. Departures will be on tracks 031 or 211 or 121° (southern pad only).

2. Landing on 21L/R Helipad

2.1. The helicopter shall descend on track 211° and land on the helipad.

2.2. If it is unable to make a safe landing, the helicopter shall turn left and climb on track 171° to an altitude of 500 ft. It will then turn left to the downwind track 031° and repeat the approach procedure, following a (standard) left-hand traffic pattern.

2.3. Circuit is left-hand for 21L/R landings.

3. Landing on O3L/R Helipad

3.1. The helicopter shall descend on track 031° and land on the helipad.

3.2. If it is unable to make a safe landing, the helicopter shall turn right and climb on heading 061° to an altitude of 500 ft. It will then turn right to the downwind track 211° and repeat the approach procedure, following a (non-standard) right-hand traffic pattern.

3.3. Circuit is right-hand for 03L/R landings.

Note: Takeoff 121° heading or Landing 301° heading is permitted at the southern platform only.

If it is unable to make a safe landing on 301°, the helicopter shall turn left and climb to 500' and to a reciprocal heading of 121° until able to re-establish final approach with left turn to final on 301° approach heading.

AD 3.22 ADDITIONAL INFORMATION

NIL.

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