

DGCA GROUND SCHOOL — AIR REGULATIONS

Search & Rescue

Chapter 11 — Annex 12 · AIP India · CAR Section 9 Air Space & Navigation Standards ·
Series 'S', Part I Issue II

 CPL / ATPL Examination

 Air Regulations

IN DGCA India

 17 Q&A Included

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SAR Services — International Obligations

Annex 12, ICAO · AIP India Chapter 11

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CORE REGULATORY OBLIGATION — CONTRACTING STATES

Contracting States shall, individually or in cooperation with other States, **arrange for the establishment and prompt provision** of search and rescue services within their territories to ensure that **assistance is rendered to persons in distress**. Such services shall be provided on a **24-hour basis**.



HIGH SEAS / UNDETERMINED SOVEREIGNTY AREAS

Those portions of the **high seas or areas of undetermined sovereignty** for which SAR services will be established shall be determined on the basis of **Regional Air Navigation Agreements**.

24

Hour SAR Service
Coverage

365

Days Per Year — No
Exceptions

ICAO

Annex 12 Authority

2

Search & Rescue Regions (SRR)

Annex 12 • National Provisions



DEFINITION — SEARCH & RESCUE REGION (SRR)

An area of defined dimensions associated with a Rescue Coordination Centre within which SAR services are provided.



STRICT RULES FOR SAR REGIONS

- ▶ Contracting States **shall delineate** the search and rescue regions within which they will provide services.
- ▶ SAR regions **shall NOT overlap**.
- ▶ Neighboring SAR regions **shall be contiguous** (no gaps allowed).

IN INDIA'S SAR REGION (SRR) — KEY FACT

The boundary of the **Indian Aeronautical SRR** coincides with the **Indian FIR boundary**, *excluding* the portion of FIR over the sovereign territory of the **Kingdom of Bhutan**.

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Rescue Coordination Centres & Sub-Centres

Annex 12 • Chapter 11



RESCUE COORDINATION CENTRE (RCC)

A unit responsible for **promoting efficient organization** of search and rescue services and for **coordinating the conduct of SAR operations** within a SAR region.



RESCUE SUB-CENTRE (RSC)

A unit subordinate to an RCC, established to **complement the latter** according to particular needs of the SAR authority.

INDIA'S FOUR AERONAUTICAL RCCS (AAI)

Airports Authority of India (AAI) coordinates SAR services through **four Rescue Coordination Centres** established at:

Delhi

Delhi FIR

Mumbai

Mumbai FIR

Kolkata

Kolkata FIR

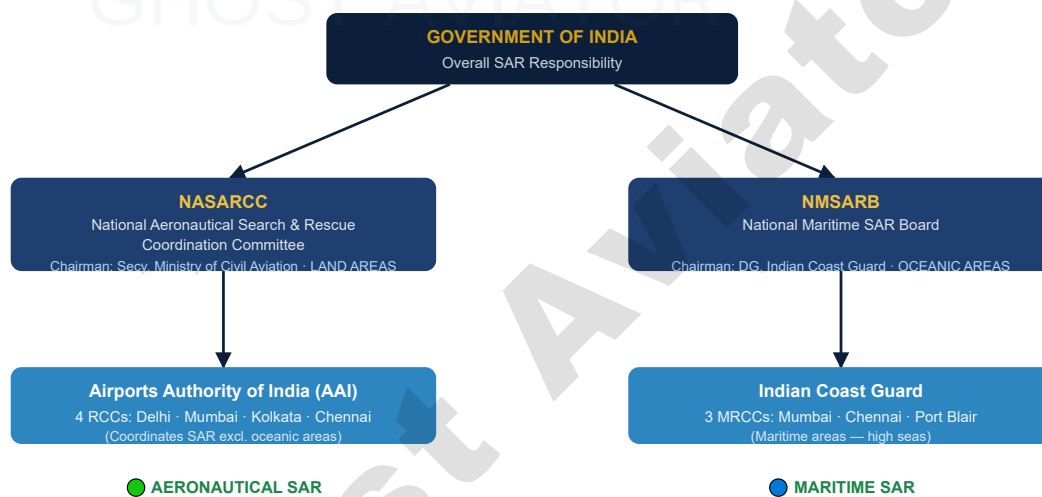
Chennai

Chennai FIR

IN GOVERNMENT OF INDIA — SAR RESPONSIBILITY

Indian Government has assumed the responsibility of providing **Search and Rescue (SAR) cover in Indian Search & Rescue Regions (SRR)**.

INDIAN SAR ORGANIZATIONAL STRUCTURE



ADDITIONAL SAR RESOURCES AVAILABLE

The following departments and organisations are also available for SAR missions when required:

- ▶ Railways, Post & Telegraph, All India Radio
- ▶ Police and District Collectors / Magistrates
- ▶ Municipal and Local bodies
- ▶ Airline operators, Flying clubs, Professional Pilots
- ▶ Mercantile Marine, Port Trust
- ▶ **Armed Forces**



SAR COVERAGE — TERRITORIAL EXTENT

- ▶ SAR services cover the entire **Indian Territory including territorial waters.**
- ▶ Also covers portions of high seas / areas of undetermined sovereignty where responsibility has been **delegated to India.**
- ▶ Indian Aeronautical SRR boundary = **Indian FIR boundary**, EXCLUDING sovereign territory of Kingdom of Bhutan.

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EQUIPMENT — SAR UNITS

Search and rescue units shall be provided with equipment for:

- ▶ **Locating promptly** the scene of an accident
- ▶ **Providing adequate assistance** at the scene of an accident

SAR Aircraft Equipment Requirements

Requirement	Detail
Communications	Equipped to communicate on the aeronautical distress and on-scene frequencies , and on such other frequencies as may be prescribed.
Homing Device	Equipped with a device for homing on distress frequencies .
Maritime Communication	When used over maritime areas — equipped to communicate with vessels .
International Code of Signals	When used over maritime areas — must carry a copy of the International Code of Signals to overcome language difficulties with ships.



VESSEL COMMUNICATION FREQUENCIES

Many vessels can communicate with aircraft on:

2182 kHz**4125 kHz****121.5 MHz**

⚠ NOTE: These frequencies, and in particular **121.5 MHz**, may **NOT** be routinely monitored by vessels.



SURVIVAL EQUIPMENT — COLOUR CODE FOR DROPPED CONTAINERS

Survival equipment dropped by SAR containing **food and water** will be packed in containers and indicated by streamers of **Blue colour**.

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6.1 — PIC at the Scene of an Accident

WHEN PIC OBSERVES ANOTHER AIRCRAFT OR SURFACE CRAFT IN

✓ **DISTRESS — SHALL IF POSSIBLE AND UNLESS UNREASONABLE/UNNECESSARY:**

- a Keep the craft in distress **in sight** until compelled to leave the scene or advised by the RCC that it is no longer necessary.
- b **Determine the position** of the craft in distress.
- c As appropriate, **report to the RCC or ATS unit** as much information as possible.

⚠ **COMMAND RESPONSIBILITY — NON-SAR AIRCRAFT FIRST ON SCENE**

If the **first aircraft to reach the scene of an accident is NOT a search and rescue aircraft**, it shall **take charge of on-scene activities** of all other aircraft subsequently arriving until the **first SAR aircraft reaches the scene** of the accident.

ON-SCENE COMMAND — WHO'S IN CHARGE?



6.2 — PIC Intercepting a Distress Transmission



WHenever a distress transmission is intercepted — PIC shall if feasible:

- a Acknowledge** the distress transmission.
- b Record the position** of the craft in distress *if given*.
- c Take a bearing** on the transmission.
- d Inform the appropriate RCC or ATS unit** of the distress transmission, giving all available information.
- e At the pilot's discretion, while awaiting instructions, proceed to the position given in the transmission.**



EXAM TIP — DISTRESS TRANSMISSION STEPS

Remember the mnemonic: **A-R-B-I-P** — Acknowledge · Record position · Bearing · Inform RCC · Proceed (at discretion).

The key qualifier is "*if feasible*" — the pilot must do **all five actions if feasible**, but is not obligated if they genuinely cannot.

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7.1 — Aircraft Directing Surface Craft to a Distress Location

SIGNAL SEQUENCE — MEANING: "FOLLOW ME TO DISTRESS LOCATION"

The following manoeuvres performed **in sequence** by an aircraft mean that it wishes to direct a surface craft towards an aircraft or a surface craft in distress:

- a** **Circling** the surface craft at least once.
- b** **Crossing the projected course** of the surface craft close ahead at *low altitude*, and one of:
 - ▶ **(1) Rocking the wings** — primary visual signal
 - ▶ **(2) Opening and closing the throttle** — sound signal (alternative)
 - ▶ **(3) Changing the propeller pitch** — sound signal (alternative)
- c** **Heading in the direction** in which the surface craft is to be directed.

IMPORTANT NOTE ON SOUND SIGNALS

Due to high noise levels on board surface craft, the sound signals in (2) and (3) may be **less effective** than the visual signal in (1) and are regarded as **alternative means of attracting attention**.

Repetition of such manoeuvres has the same meaning.

7.2 — Aircraft Signal: "Assistance No Longer Required"

✓ **SIGNAL MEANING ASSISTANCE IS NO LONGER REQUIRED:**

Crossing the wake of the surface craft close astern at a low altitude, and one of:

- ▶ Rocking the wings
- ▶ Opening and closing the throttle
- ▶ Changing the propeller pitch

7.3 — Surface Craft Replies to Aircraft Signals

For Acknowledging Receipt of Signals (Meaning Understood)

- 1 Hoisting the **"code pennant"** (vertical **red** and **white** stripes) **close up** — meaning: understood
- 2 Flashing a succession of **"T's"** by signal lamp in **Morse code**
- 3 **Changing heading to follow** the aircraft

For Indicating Inability to Comply

- 1 Hoisting the international flag **"N"** (a **blue** and **white** checkered square)
- 2 Flashing a succession of **"N's"** in Morse code

8.1 — Code for Use by SURVIVORS

No.	Message	Code Symbol
1	Require Assistance	V
2	Require Medical Assistance	X
3	No or Negative	N
4	Yes or Affirmative	Y
5	Proceeding in This Direction	↑



SYMBOL SIZE REQUIREMENT

Symbols shall be at least **2.5 metres (8 feet) long** and shall be made as conspicuous as possible. Provide as much colour contrast as possible between signals and background.



HOW SYMBOLS MAY BE FORMED

- ▶ Strips of fabric, parachute material, pieces of wood, stones or similar material
- ▶ Marking the surface by trampling or staining with oil
- ▶ Attention may also be attracted by: **radio, flares, smoke, and reflected light**

8.2 — Code for Use by RESCUE UNITS

No.	Message	Code Symbol
1	Operation Completed	LLL
2	We have found ALL personnel	LL
3	We have found ONLY SOME personnel	++
4	We are not able to continue. Returning to base.	XX
5	Have divided into two groups. Each proceeding in direction indicated.	↔
6	Information received that aircraft is in this direction.	→ →
7	Nothing found. Will continue to search.	NN



MEMORY AID — RESCUE UNIT SYMBOLS

LLL = All done (3 letters = Complete) · **LL** = Found ALL (2 = complete set) · **++** = Partial (plus signs = something, but not all) · **XX** = Cannot continue (X = wrong/stopped) · **NN** = Nothing found, keep going

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Air-to-Ground Signals

Annex 12 · SAR Signals



AIRCRAFT ACKNOWLEDGING GROUND SIGNALS

The following signals by aircraft mean that the **ground signals have been understood**:



DURING DAYLIGHT HOURS

Rocking the aircraft's wings

A clear, visible acknowledgement that ground signals are understood.



DURING DARKNESS HOURS

Flashing on and off TWICE the aircraft's landing lights, or if not so equipped, by **switching on and off TWICE** its navigation lights.



LACK OF SIGNAL = NOT UNDERSTOOD

Lack of the above signals indicates that the **ground signal is NOT understood**.

Satellite-Aided SAR — COSPAS-SARSAT

AIP India • Chapter 11 • Satellite-aided SAR



WHAT IS COSPAS-SARSAT?

India has evolved a **Satellite-aided Search and Rescue programme** by participating in the **COSPAS/SARSAT system**. It is a **SAR satellite-aided tracking system** that helps locate distress beacons.

406

MHz — Operating
Frequency

5 km

Normal Location Accuracy

2

Local User Terminals
(LUTs)



COSPAS-SARSAT INFRASTRUCTURE IN INDIA

- ▶ **2 Local User Terminals (LUTs)** established at: **Bangalore** and **Lucknow**
- ▶ **Indian Mission Control Centre (INMCC)** located at **Bangalore**
- ▶ INMCC is responsible for coordination with RCCs and other International Mission Control Centres
- ▶ INMCC at Bangalore is connected with RCCs at **Mumbai, Delhi, Kolkata and Chennai** through **AFS network**
- ▶ Any distress alert received from covered areas is **automatically transmitted** to the RCC



COUNTRIES COVERED BY INDIAN COSPAS-SARSAT DETECTION

The system detects transmissions throughout the Indian SRR and also SRR of:

Bangladesh

Myanmar

Bhutan

Indonesia

Kenya

Malaysia

Maldives

Mauritius

Nepal

Seychelles

Singapore

Somalia

Sri Lanka

Thailand

Tanzania



INDIA'S SAR ARRANGEMENT

- ▶ India currently has SAR Arrangement with **Royal Government of Bhutan**.
- ▶ India can seek SAR assistance from adjoining RCCs of other nations in accordance with **bi-lateral agreement**.
- ▶ For the purpose of SAR, authorities of other States who wish their SAR units to enter the territory of India shall **transmit a request, giving full details of the projected missions and the need for it**.



INSTRUCTIONS

The following 17 questions are sourced directly from the textbook. Correct answers are highlighted in **green**. Explanations drawn from the regulatory text are provided below each question.

Q1 The units responsible for promoting efficient organization of search and rescue service are:

- ☐ A Area control centre, flight information centre and rescue coordination centre
- ☒ B Rescue coordination centre and rescue sub-centres
- ☐ C Alerting centre and rescue coordination centre

☒ **ANSWER: B**

The RCC and RSC are specifically responsible for promoting efficient organization of SAR services and coordinating operations. ACCs and FICs serve ATS functions, not SAR management.

Q2 Three aircraft (1), (2) and (3) arrive successively at ten minute intervals overhead the scene of a recent aircraft accident. Aircraft (1) is unable to establish contact with the SAR Centre. Aircraft (2) is able to contact the SAR Centre. Aircraft (3) is a SAR helicopter. The command of the situation is the responsibility of:

- ☒ A (1), then by mutual consent (2) and then (3)
- ☐ B (1), and then by mutual consent to (3)
- ☐ C (1), then by mutual consent (2) until the completion of operations

☒ **ANSWER: A**

The first aircraft on scene (1) takes command. When (2) arrives, command may pass by mutual consent. When the SAR helicopter (3) arrives, it should eventually take command as the designated SAR asset – command passes by mutual consent to (3).

Q3 What is the meaning of the symbol "V" in the ground-air visual signal code for use by survivors?

- ☐ A Landing here impossible
- ☒ B Require assistance
- ☐ C Require medical assistance

☒ **ANSWER: B**

V = Require Assistance (general help). X = Require Medical Assistance. "Landing here impossible" is not part of the survivor's ground-air code.

Q4 What is the meaning of the symbol "LLL" in the ground-air visual signal code for use by rescue units?

- ☒ A Operation completed
- ☐ B We are returning to base
- ☐ C We have found all personnel

☒ **ANSWER: A**

LLL = Operation Completed. LL = We have found ALL personnel. XX = Cannot continue / returning to base.

Q5 Which of the following is NOT an international distress frequency?

- ☐ A 243.0 MHz
- ☐ B 2182 KHz
- ☒ C 2430 KHz

☒ **ANSWER: C**

Recognised international distress frequencies include 121.5 MHz (civil), 243.0 MHz (military), 2182 kHz (maritime), and 406 MHz (COSPAS-SARSAT). 2430 kHz is NOT an internationally designated distress frequency.

Q6 An aircraft is flying over a mountainous region in which a search is being carried out to find the survivors of an aircraft accident. The pilot sees a ground signal in the form of an "X". This indicates:

- ☐ A "All occupants alive"
- ☐ B "Need mechanical assistance"
- ☒ C "Need medical assistance"

☒ **ANSWER: C**

X = Require Medical Assistance — this is one of the five survivor ground-air visual signal codes. V = Require Assistance (general).

Q7 At night an aircraft observes a luminous signal requesting help. To indicate that he has received these ground signals, the pilot must:

- ☐ A Make at least one complete turn over the group of people in difficulty
- ☐ B Transmit, by luminous Morse signal, a series of the letter "R" using his navigational lights
- ☒ C Switch his landing lights on and off twice or, if he is not so equipped, his navigation lights twice

☒ **ANSWER: C**

The air-to-ground signal at night confirming ground signals understood = flashing landing lights (or nav lights) ON and OFF TWICE.

Q8 The color identification of the contents of droppable containers and packages containing survival equipment should take the form of coloured streamers according to the following code:

- ☐ A Red for medical supplies and first aid equipment
- ☐ B Black for food and water
- ☐ C Blue for blankets and protective clothing

✓ **ANSWER: C**

*The text specifies that survival equipment dropped by SAR containing food and water will be in containers indicated by **Blue streamers**. Blankets/protective clothing are also identified by blue in the full international colour code.*

Q9 COSPAS-SARSAT is:

- ☐ A A communication system linking all aircraft
- ☐ B A space system for the search of vessels in distress
- ☐ C A SAR satellite-aided tracking system

✓ **ANSWER: C**

COSPAS-SARSAT is a SAR satellite-aided tracking system operating on 406 MHz. India participates through INMCC Bangalore, LUTs at Bangalore and Lucknow.

Q10 You are flying in Mumbai FIR when you intercept a distress call. You record the message and tell Mumbai FIC. The radio operator at Mumbai tells you to standby. What should you consider doing whilst awaiting instructions?

- ☐ A Make a general call on 121.5 asking other airplanes to assist
- ☐ B Descend to low level and carry out a surface search for ships
- ☐ C Proceed to the position given in the distress message

✓ **ANSWER: C**

Per the procedure for intercepting a distress transmission (step e): "At the pilot's discretion, while awaiting instructions, proceed to the position given in the transmission."

Q11 Search and Rescue services within the territory of ICAO contracting states are provided:

- ☒ **A** On a 24-hour basis
- ☐ **B** When the authority of the contracting state decides to do so
- ☐ **C** From sunset to sunrise

✓ **ANSWER: A**

Contracting states are obligated to provide SAR services on a 24-hour basis — no exceptions, no authority discretion required.

Q12 Contracting States shall establish a rescue co-ordination centre:

- ☐ **A** At every ATS facility
- ☒ **B** In each search and rescue region
- ☐ **C** If they are adjacent to the sea

✓ **ANSWER: B**

One RCC per Search and Rescue Region. In India, four RCCs correspond to four FIRs: Delhi, Mumbai, Kolkata, Chennai.

Q13 A Rescue Unit is:

- ☐ A A unit assisting a RCC in SAR duties
- ☒ B A unit composed of trained personnel and provided with equipment suitable for the expeditious conduct of SAR
- ☐ C A unit responsible for SAR service in co-operation with a RCC

☒ **ANSWER: B**

A Rescue Unit is defined as a unit composed of trained personnel, provided with equipment suitable for the expeditious conduct of SAR operations.

Q14 Which of the following statements regarding Alerting service is correct?

- ☐ A Aircraft in the vicinity of an aircraft known or believed to be the subject of unlawful interference, shall be informed about this
- ☐ B The Alert phase is established when no communication has been received from an aircraft within a period of thirty minutes after the time a communication should have been received
- ☒ C Alerting Service and Flight Information Service are often provided by the same ATS unit

☒ **ANSWER: C**

Alerting Service and FIS are frequently collocated and provided by the same ATS unit (typically a FIC). The Alert phase (ALERFA) is established after 30 minutes of no communication — but the Alert phase is triggered when an aircraft is overdue, not simply when no communication was received in 30 minutes from when it should have been received (that is closer to the Uncertainty phase).

Q15 Whenever a distress signal and/or message or equivalent transmission is intercepted by the PIC of an aircraft, he shall:

- ☒ A Record the position of the craft in distress if given and if possible take a bearing on the transmission
- ☐ B If possible take a bearing on the transmission
- ☐ C Record the position of the craft in distress if given

☒ **ANSWER: A**

Both recording the position AND taking a bearing are required actions (if feasible). Answer A correctly combines both obligations. Neither B nor C alone is the complete requirement.

Q16 What is the meaning of SAR signal "N" when used by survivors on the ground:

- ☒ A Negative
- ☐ B Require medical assistance
- ☐ C Require assistance

☒ **ANSWER: A**

In the survivor ground-air visual code: N = No / Negative. X = Require Medical Assistance. V = Require Assistance.

Q17 Survival equipment, dropped by SAR and containing food and water will be packed in containers and indicated by streamers of following colour:

A Green

B Blue

C Yellow

☒ **ANSWER: B**

Directly from the text: "Survival equipment, dropped by SAR and containing food and water will be packed in containers and indicated by streamers of Blue colour."



Quick Reference — Key Facts Summary

Examination Ready Recall Sheet

Topic	Key Fact
SAR Service Hours	24 hours — no exception
SAR Regions	Must NOT overlap · Must be contiguous
India Aeronautical RCCs	Delhi · Mumbai · Kolkata · Chennai (4 total — AAI)
India Maritime MRCCs	Mumbai · Chennai · Port Blair (3 total — Indian Coast Guard)
Indian Aeronautical SRR	Coincides with Indian FIR boundary (excluding Bhutan)
Land SAR Authority	NASARCC — Secy, Ministry of Civil Aviation as Chairman
Maritime SAR Authority	NMSARB — DG, Indian Coast Guard as Chairman
COSPAS-SARSAT Frequency	406 MHz
COSPAS-SARSAT Accuracy	Normally within 5 km
LUTs (Local User Terminals)	Bangalore and Lucknow
INMCC Location	Bangalore
SAR Dropped Container Colour	Blue streamers — food and water
Survivor "V"	Require Assistance
Survivor "X"	Require Medical Assistance
Survivor "N"	No / Negative
Survivor "Y"	Yes / Affirmative
Rescue Unit "LLL"	Operation Completed
Rescue Unit "LL"	Found ALL personnel

Topic	Key Fact
Rescue Unit "++"	Found ONLY SOME personnel
Rescue Unit "XX"	Cannot continue — returning to base
Rescue Unit "NN"	Nothing found — will continue to search
Air-to-Ground (Day)	Rock wings = ground signal understood
Air-to-Ground (Night)	Flash landing/nav lights TWICE = understood
Symbol Minimum Size	2.5 metres (8 feet) long
SAR Agreement	India has arrangement with Royal Government of Bhutan
Vessel Comms Frequencies	2182 kHz · 4125 kHz · 121.5 MHz

Study Notes compiled for **CPL / ATPL Examinations** · Chapter 11: Search & Rescue · AIP India / CAR
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