

APPROVED

TSOLMON.J
DIRECTOR AND GENERAL INVESTIGATOR
AIRCRAFT ACCIDENT AND INCIDENT
INVESTIGATIONS BUREAU

PROCEDURE FOR OBTAINING, PROTECTING, AND PRESERVING
AIRCRAFT RECORDING DEVICES (FDR/CVR) AND AIR TRAFFIC
CONTROL (ATC) RECORDINGS, PROTECTION AND PRESERVATION

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|--------------------|-------------------|--------|-----------|
| Document reference | AAIIB - 25 - 10 | | |
| Date of approval: | year- | month- | day- |
| Reviewed by: | Name and Position | Date | Signature |
| Prepared by: | Name and Position | Date | Signature |

Record of Amandments

| Amendment No | Description of Amendment | Section affected | Name and position | Date | Signature |
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PROCEDURE FOR OBTAINING, PROTECTING, AND PRESERVING AIRCRAFT
RECORDING DEVICES (FDR/CVR) AND AIR TRAFFIC CONTROL (ATC)
RECORDINGS, PROTECTION AND PRESERVATION

ONE. GENERAL

1.1. This procedure regulates the obtaining, use in investigations, protection, and preservation of aircraft recording devices (flight data and cockpit voice recordings), air traffic control communication recordings, and related documents in the event of an aircraft accident or incident, in accordance with Annex 13 to the Chicago Convention (Attachment D).

1.2. When obtaining and using aircraft flight data, cockpit voice recordings, air traffic control communication recordings, and related documents in aircraft accidents and incidents, the Aircraft Accident and Incident Investigation Bureau (hereinafter "AAIIB") shall follow the guidance set out in ICAO Doc 9756 and Doc 9962.

1.3. It also regulates the relationship with other organizations participating in investigations to obtain aircraft flight data, cockpit voice recordings, air traffic control communication recordings, and related documents in accidents and serious incidents involving aircraft registered in Mongolia or operated by an entity authorized to operate in Mongolia, where the occurrence takes place outside the territory of Mongolia.

1.4. This procedure shall be followed by investigators participating in the investigation for the purpose of obtaining flight data, cockpit voice recordings, air traffic control communication recordings, and related documents when an aircraft accident or serious incident occurs.

**TWO. READOUT OF AIRCRAFT RECORDING DEVICES
READOUT OPERATIONS**

2.1. Participation in readout operations

a) The State conducting the investigation of the aircraft accident or incident shall permit participation in the readout of the aircraft recording devices by representatives of the following States:

- State of Design
- State of Manufacture
- accredited representatives and specialists of the State of the Operator, as well as appointed team members and specialists from any State providing equipment upon request.

b) Accredited representatives and foreign specialists assisting the investigation may be allowed to participate in readout operations to the extent necessary to make their participation effective;

c) Technical specialists may be brought in whenever necessary to support the readout operation;

d) The AAIB may participate in readout operations during investigations of accidents and serious incidents involving aircraft registered in Mongolia that occur outside the territory of Mongolia;

e) The team appointed by the AAIB and Mongolian accredited representatives and advisers shall prevent disclosure of information on investigation progress, the status of recorder readout, and findings, unless expressly authorized by the State conducting the investigation. Since disclosure of such information is the responsibility of that State,

the AAIB shall ensure that its officials and advisers subject to Mongolian jurisdiction comply with this rule.

2.2. On-site operations

2.2.1. The State conducting the investigation of an aircraft accident or serious incident shall promptly arrange for the reading of the actual flight data recorder readout in accordance with section 4.6.1.5 of AAI Regulation, ICAO Annex 13, "Attachment D".

2.2.2. The period immediately following an aircraft accident or serious incident is a highly responsible phase for any investigating authority.

One of the urgent decisions is where recorder readout and analysis will be performed. It is essential to recover and read the recording devices as soon as possible after an aircraft accident or serious incident in order to establish what happened.

The following tasks shall be performed:

- Recover the recording device;
- Photograph and document the condition found;
- Assess the environment in which the recording devices were located and determine from external examination whether the recording may have been damaged;
- Prepare the recording device;
- Prepare the recording device for transport, move it under safe protection as quickly as possible, and deliver it to the readout laboratory;
- Download the data under laboratory conditions, load it into a computer, read the recording, and prepare the report.

2.2.3. The process of transcribing and reviewing recordings shall be carried out promptly and shall not be delayed due to administrative, judicial, or financial reasons.

2.2.4. The funding required for the transcription and review of recordings shall be arranged through two methods, namely:

- Assistance and support from countries with which a memorandum of cooperation has been established;
- Investigative operation expenses included in the organization's annual budget.

2.2.5. Locating the aircraft flight recording device

- The AAIB shall participate in the search for the recording device and shall ensure that personnel from other participating organizations are briefed on FDR/CVR equipment.
- The recording device is bright red or orange, protected against external impact, fire, and water, and designed to withstand 1,100°C for 30 minutes.
- Its location shall be identified using specialized equipment and the underwater locator device attached to the flight recorder, and the recorder shall then be recovered.

2.3. Recorders submerged in water

2.3.1. If the aircraft recording device is under sea or ocean water, the AAIB shall contact relevant organizations and sources outside Mongolia in order to locate and recover it without delay. Investigation authorities of other States with significant relevant experience should also be consulted.

2.3.2. A plan shall be prepared to determine where the readout of a water-submerged aircraft recording device will be performed, and the decision shall depend on the recorder manufacturer and operator. Readout may be conducted in the FDR/CVR laboratories of the investigation authorities of the Russian Federation, the Republic of Korea, and the French Republic, with which cooperation memoranda have been signed.

2.3.3. Its location shall be identified using specialized equipment and the underwater locator device attached to the flight recorder, and the recorder shall then be recovered.

2.3.4. At the accident site, the aircraft recording device shall not be cleaned, washed, or dried. After immersion in salt water, the recording medium shall be carefully rinsed with fresh water and kept immersed in clean water to reduce corrosion and deterioration. Note: a recorder recovered from water is best transported in a container filled with water and shall not be removed from the water until specialist personnel clean and dry it in the laboratory.

2.4. Rights and duties of the investigator-in-charge (IIC)

2.4.1. Laws and investigation rules relating to accident investigation grant investigator- (IIC) the following rights:

- to go to the aircraft accident site and, as quickly as possible, inspect and take control of all relevant physical evidence and recording devices;
- to request information relating to the aircraft accident or serious incident from the operator, owner, flight crew, aircraft crew, personnel working at the accident site, and other relevant persons (hereinafter "persons concerned");
- to enter the aircraft accident site and any other place considered necessary, handle the recording devices installed on the aircraft—FDR, CVR, and QAR (hereinafter "relevant devices")—and copy recordings from them;
- to meet the persons concerned, ask questions, and take statements;
- to require the owner, possessor, or authorized person to produce, protect, and preserve relevant materials or physical evidence;
- to enter the place of the aircraft accident or any other place related to the accident;
- to thoroughly examine relevant materials or evidence and the connection, installation, and serviceability of the FDR, CVR, and QAR free from outside interference;
- to bring aircraft recording devices to the readout laboratory without hindrance when required;

2.4.2. Information on operations carried out in the readout laboratory and on the recordings of aircraft recording devices shall not be passed to others or disclosed.

2.4.3. Except for accident prevention purposes, the following FDR/CVR recordings shall not be disclosed:

- information provided to the investigation bureau by persons concerned during the investigation;
- communications between persons involved in flight operations;
- opinions and conclusions concerning any information, including analysis of recorder data.

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- to enter the aircraft accident site and any other place considered necessary, handle the recording devices installed on the aircraft—FDR, CVR, and QAR (hereinafter "relevant devices")—and copy recordings from them;
- to meet the persons concerned, ask questions, and take statements;
- to require the owner, possessor, or authorized person to produce, protect, and preserve relevant materials or physical evidence;
- to enter the place of the aircraft accident or any other place related to the accident;
- to thoroughly examine relevant materials or evidence and the connection, installation, and serviceability of the FDR, CVR, and QAR free from outside interference;
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- opinions and conclusions concerning any information, including analysis of recorder data.

2.5. Selection of the technical laboratory

2.5.1. Most States do not have equipment to read recording devices and therefore seek assistance from other States. Accordingly, the competent authority conducting the investigation shall arrange the readout in a timely manner at an appropriate technical laboratory in another State, other than the manufacturer when necessary.

2.5.2. The State conducting the investigation may submit a request to any State it considers suitable. Ordinary standard replay or recovery software is not suitable for investigation purposes because the recorder may have been damaged in the accident or incident; specialized equipment is therefore required.

2.5.3. The technical laboratory shall be equipped with the following equipment and facilities:

- a) capability to disassemble and recover severely damaged recording devices and read their recordings;
- b) capability to reconstruct original recordings from accidents and incidents, disassemble the recorder, remove its memory, and recover the recording;
- c) capability to reconstruct flight data and binary signal oscillations recorded on damaged tape, read the recording, and analyze it;
- d) capability to filter, listen to, and amplify audio signals and speech using appropriate software;
- e) capability to display data graphically, analyze it, view additional parameters, and confirm data validity through other means within the corresponding limits.

2.6. Participation of the State of Manufacture and the State of the Operator

2.6.1. Since the State of Manufacture (or assembly) has responsibility with respect to airworthiness, it may provide qualified personnel for recorder data readout operations.

2.6.2. Because information recorded on the device may reveal or clarify issues relating to airworthiness in the State of Manufacture, that State may need to send its representative to participate in the readout even when it is conducted in a State other than its own.

2.6.3. Since the State of the Operator bears responsibility under operational regulations, it may provide assistance in analytical work related to the operator's activities.

2.6.4. Since information recorded on the flight recorder can quickly identify operational issues, representatives of the State of the Operator should participate in the readout operation.

2.7. Operational recommendations

2.7.1. Readout of the flight data recorder and cockpit voice recorder should be carried out in a single technical laboratory. Because the recorded data are interrelated in sequence and timing and often corroborate one another, this provides clear benefits.

2.7.2. Before reading the recording device, it shall not be disassembled or connected to electrical power, as this may damage the recording.

2.7.3. A technical laboratory that has read the recording device of another State may provide cautionary notes for inclusion in the final report regarding the results of recorder analysis.

2.7.4. The technical laboratory conducting the readout may need professional assistance from the aircraft manufacturer and operator in order to validate the recorded information and verify calibration data.

2.7.5. Because further questions, requests, or clarifications may arise, the State conducting the investigation may require the technical laboratory that performed the readout to retain the original recording and copies until the investigation is complete.

2.8. Technical equipment

2.8.1. The laboratory shall be fully equipped with the equipment required for recorder readout, including power units and electrical frequency converters.

2.8.2. Depending on the type and model of recording device installed on the aircraft, the laboratory shall have the appropriate transmission cables, connectors, download computer, and software for downloading data from all types of FDR/CVR devices installed on it.

2.8.3. The laboratory shall have software for reading flight data from all aircraft types used in the State, files of constant aircraft parameters, and relevant standards, procedures, and documents.

2.8.4. The flight recorder readout laboratory shall have a properly grounded environment protected against static electricity and electrical current in accordance with applicable procedures.

2.9. Personal protective equipment for participants in readout operations

- Protective equipment may be required when recorder readout is conducted under laboratory conditions away from the accident site. Training and equipment for protection from static electricity, electrical current, and magnetic fields shall be obtained from competent professional organizations.

- Protective gloves shall be worn when handling equipment, power units, and electrical sources.

- Use anti-static wrist straps and shoe sole protection.

- Laboratory personnel who may have direct contact with contaminated materials shall wear latex gloves under work gloves, and these must be durable. They shall be disposed of in accordance with procedure after use.

- Work gloves shall be durable and practical to use and shall protect the hands and wrists from punctures and abrasions.

- Disposable overshoes. It is advisable to use disposable plastic or rubber overshoes when entering the laboratory.

- Disinfectants. Two types of chemicals are widely used to disinfect personal protective equipment. A 70% alcohol solution is effective and is available pre-soaked in small and large wipes. The most effective disinfecting solution is ordinary household chloramine diluted at a ratio of one part chloramine to ten parts water. Alcohol and chloramine shall never be mixed.

- Complete personal protective kit. A complete personal protective kit shall be available for each person. It includes a full-body protective suit, several pairs of latex gloves, work gloves, a face mask, protective eyewear, overshoes, safety boots, and disinfectants.

- Contaminated examination equipment. Contaminated investigative equipment such as tools, flashlights, and measuring tapes shall be washed with soapy water, disinfected, and dried. Equipment that cannot be immediately disinfected shall be placed in a biohazard waste bag. The waste bag and its contents shall be incinerated at an appropriate facility such as a hospital.

2.10. Damaged recording devices

- Exposed parts of the flight recording device shall be handled with extreme care to prevent loss of recorded information. If the recorder is damaged, as many parts as possible shall be collected.
 - Electronic circuits shall be carefully collected and stored in labeled anti-static plastic bags.
 - Even if the recording tape is broken, it may be reassembled; therefore, as much magnetic tape as possible shall be collected.
 - Damaged or burned recorders shall be taken to a laboratory equipped with specialized equipment, disassembled, and major components such as the memory chip shall be removed in order to recover information and recording data.
 - Recovery of recordings from damaged devices may be conducted in the laboratories of investigation authorities of States with which cooperation agreements have been concluded.
 - A plan shall be prepared for where recorder readout will be conducted depending on the aircraft and recording device manufacturer and operator. Readout may be performed in the FDR/CVR laboratories of the investigation authorities of the Russian Federation, the Republic of Korea, and the French Republic, with which memoranda of cooperation have been signed.

2.11. Photographing, documenting, and securing recording devices

- The investigation bureau shall take control of the recording devices of aircraft involved in accidents and serious incidents, protect them from fire and further damage, and document them by photographs and other appropriate means.
 - Where necessary and as provided in the relevant rules, the bureau shall place the recording devices under its own custody.
 - Chain-of-custody arrangements shall be established for the recording medium and records shall be maintained.
 - Continuity of custody shall not be broken.

2.12. Examination of recording devices

- The external condition of the location where the recording device was found shall be examined to determine whether the device or recording may have been damaged.
 - Damage to the input and output ports of the recording device and the integrity of cables used for downloading or transferring data shall be checked.
 - The condition and location of the accident or serious incident site affect the decision whether the aircraft recorder can be read at all. Because flight data recordings contain important evidence for aircraft safety, the competent investigation authority shall provide the necessary impetus to ensure rapid recovery of the recorder.

2.13. Preparation of the recording device

- The recording device shall be brought urgently and without delay to the bureau's readout laboratory in order to determine the damage and whether readout is possible.
- If requested by the aircraft and recorder manufacturer, designer, State of final assembly, or operator, the aircraft recording device shall not be disturbed, moved, or transported until they arrive for inspection. This shall not in any way impede the investigation conducted by the bureau. If, before an accredited representative arrives, the aircraft or other items must be moved or otherwise handled for reasons not reasonably foreseeable, the actions taken shall be documented by photographs and other appropriate means.
- A clear assessment of the damage shall be made in advance in order to determine where recorder readout can be performed.
- Depending on the type of recording device, the documents and materials necessary for readout shall be obtained from the relevant manufacturer, certifying authority, State of Design, State of final assembly, and State of the Operator.
- Standard documentation on the aircraft's flight data parameters and related materials shall be requested from the State that designed and manufactured the aircraft (or the organization responsible for design and final assembly) and from the State of the carrier.
- The State leading the readout operation shall be provided with the following:
 - all accident-related information requested by that State;
 - information on the organizations that used or had previously used the aircraft recording device before the accident or serious incident;
 - the operator's recordings of flights performed by the aircraft during the previous 6 months;
 - for the State of Registry or the State of the carrier, any previous flight recorder recordings relating to earlier accidents or serious incidents involving that aircraft.
- Before transport, the recording device shall be placed in a dedicated container, sealed and marked for identification, and handed over to the responsible person together with a completed form in accordance with Attachment 1.

2.14. Transport of the recording device

- During transport and storage, the recording device shall remain under the responsibility of a person appointed by the leader of the investigation team.
- When a recording device is sent to a foreign readout laboratory, an officially authorized transport company shall be used, for example DHL or Mongol Post.
- A plan shall be prepared for where recorder readout will be conducted depending on the aircraft and recording device manufacturer and operator. Readout may be performed in the FDR/CVR laboratories of the investigation authorities of the Russian Federation, the Republic of Korea, and the French Republic, with which memoranda of cooperation have been signed.
- If the recording device has been in water, it shall be placed in water from the same sea, lake, or river and transported in a special container.
- The recording device shall be transported under safe protection as quickly as possible and delivered to the readout laboratory.
- To transport the aircraft flight recording medium from the aircraft to the investigation bureau's laboratory, it shall be placed in a dedicated box.
- The following may cause destruction of the recording of the flight recording device:
 - Static environment
 - Inadequate packaging

- Impact
 - When preparing recorders for final transport, suitable boxes, containers, and labels shall be used. Shipping instructions shall be concise and clear and shall specify critical transport issues and other relevant conditions. If continuous monitoring of the shipment is considered necessary, photographs of the prepared cargo, boxes, and containers shall be taken and a cargo movement log shall be opened.
 - When organizing transport, the recording device should arrive at the analytical laboratory in the same condition as when it was found at the accident site. The following points shall be observed.
 - After taking the necessary security measures, the recording devices must be transported intact.
 - For small parts, sealed double bags and the bureau seal shall be used.
 - Recognizable seals meeting the requirements, such as wire seals, shall be used.

The transport company shall meet the following requirements.

- Reliable
- Reputable
- Capable of ensuring cargo safety and security throughout all stages of transport

The transport company shall have the following:

- A record-keeping system that meets established requirements
- Locked and secure enclosures or final-stop storage facilities along the route
- If loss or damage to the recorder would seriously impede the investigation because of its critical evidentiary value, the recorder shall be sent under the protection of a dedicated security escort.
- A control form shall be provided to the transport contractor and signed for receipt and acceptance.

2.15. Readout of the recording device

- Under laboratory conditions, the data shall be downloaded, entered into a computer, and prepared for readout.
- Where necessary, the recording device shall be removed from the aircraft in accordance with the procedure, brought to the readout laboratory, and the readout operation shall be conducted there.
- If the aircraft recording devices are undamaged and functioning normally, the data shall be copied directly.
- When downloading data from the aircraft recording device, a dedicated RSU II computer shall be used together with the appropriate transmission connector according to the type and model of FDR. In this case, the aircraft engines shall be shut down and the recording device supplied with 115V, 400 Hz electrical power.
- If the aircraft recording devices are damaged and direct download of flight data is impossible, the device shall be removed from the aircraft and taken to the readout laboratory for special dismantling and reading procedures.
- If the aircraft is equipped with a Quick Access Recorder (QAR), flight data may be downloaded from the QAR and read using appropriate dedicated software.
- The investigation bureau shall have cooperation agreements with organizations that provide the relevant software and equipment necessary to improve its professional capability and perform recorder readout and data processing.
- The recording device shall be brought to the readout laboratory and connected to a 115V, 400 Hz power source; the data shall be copied using RSU II equipment and recovered using Insight Recovery software.

- If laboratory conditions do not permit downloading because the recording device is too severely damaged, the device shall be taken to a foreign laboratory equipped for full disassembly, where undamaged parts will be separated and the data extracted from them.

2.16. Preparation of the readout report

- After the readout operation has been completed, the recorder specialist and the staff of the investigating authority shall review and discuss the results. Information obtained from the flight data shall be documented to show the flight condition and performance of the aircraft, explain how the recorder was read, and present the results of the analysis by every feasible means, including tabular information, graphic information, and animated visualization.

- The aircraft recorder readout report shall be prepared in accordance with the requirements set out in Attachment C to Annex 13.

- The reporting requirements are the same for all types of civil aviation accidents and serious incidents.

- The bureau official responsible for readout operations shall prepare the flight recorder readout report. The format and content of the report shall conform to Annex 13 and Annex 6 of the Convention on International Civil Aviation. The scope of the report depends on the circumstances of the occurrence and the type of aircraft and recording devices involved. However, all accidents involving aircraft registered, operated, designed, or manufactured outside Mongolia shall fully comply with ICAO requirements.

- It is bureau policy to issue the report as quickly as possible. The completed report shall be made available on the bureau website to the public, to States participating in the investigation, and to ICAO.

- Before the readout work begins, the Chief Investigator shall have a reporting schedule prepared that includes the expected completion date. The planned time frame depends on the complexity of the accident and the related aircraft safety issues.

- For minor occurrences involving minimal safety issues, the readout report should be completed within 1 month after the accident. For major accidents involving complex safety issues, the report should be completed within 1 year or as soon as possible.

- If, for any reason, the recorder readout report cannot be completed within 1 year from the date of the accident, an interim report containing detailed information on progress and activities shall be issued.

2.17. Report format

- Introduction. The introduction shall include brief information about the accident and the aircraft type, year of manufacture, operator organization, and airline. It shall list the name and type of the aircraft recording devices, part number, serial number, and the name, type, part number, serial number, and technical characteristics of the FDAU and QAR. This section shall also include brief information on the time and place of the recorder readout operation.

- The report shall begin with a heading containing the following information: operator name, manufacturer, model, nationality and registration mark, and the place and date of the accident or incident.

- It shall briefly present the following information: the authority issuing the report and the publication date, followed by a short conclusion on the circumstances that led to the accident.

PROCEDURE FOR OBTAINING, PROTECTING, AND PRESERVING AIRCRAFT RECORDING
DEVICES AND ATC RECORDINGS

- The main body shall contain the following headings.
 - Factual information
 - Analysis
 - Conclusions
- Each heading shall consist of several subheadings as set out below, and annexes shall be included as required. Note: when preparing the final report using this format, all information relevant to factual information, analysis, and conclusions shall be grouped under the appropriate heading.
- The following information shall be collected to document the history of the flight.
 - 1) name, address, and telephone number of the aircraft owner and operator
 - 2) aircraft type
 - 3) registration mark and serial number
 - 4) flight number
 - 5) type of operation (for example, domestic air transport operator)
 - 6) date and time of the accident and the accident site location (latitude, longitude, elevation), point of departure, point of intended landing, and distance
 - 7) the last place of departure and block-off and takeoff times
 - 8) en-route stops and their block-off and takeoff times
 - 9) planned destination
 - 10) deviation from route and landing at an unplanned location
 - 13) original flight plan and certified copy
 - 14) status of clearances. Obtain certified copies. If no ATC recording section is assigned, listen to the original recording.
 - 15) route and flight altitude actually flown and normally flown, and crew familiarity with the route
 - 16) operator and ATC radio communications during the flight (facilities and frequencies), with certified copies and recordings obtained.
- Where Mongolia participates in investigations conducted by other States, the bureau shall provide its comments on draft final reports circulated under Annex 13 as soon as possible.
- If the bureau receives a draft readout report from another State for consultation, it shall take all measures necessary to prevent dissemination, publication, or other disclosure of that report or any other documents obtained during the investigation without the permission of the State conducting the investigation. If that State publishes such reports and documents, the bureau may also release them, but shall take care not to disclose unauthorized material.
- Upon completion of the report, the bureau shall promptly send copies to all States participating in the investigation, States whose citizens were killed or seriously injured, States that provided relevant information, important organizations or specialists, and ICAO (for aircraft over 5,700 kg).
- The bureau shall print the report for distribution to the public and official organizations. The report shall also be posted electronically on the AAIB website for public access.
- All flight data obtained from the recording devices shall be processed using dedicated Insight software and presented in tables and graphs in the program's standard format.
- The report on recorder readout shall include all relevant facts and parameters identified from the recording, regardless of their apparent significance, including events that occurred throughout the flight and analysis of flight parameter indications. Relevant documents and program outputs showing audio, speech, and animated visualization shall be copied to a CD and attached to the report.

- Documents showing flight parameters from the recording device shall be produced in three forms: tabular information, graphical presentation, and audio/animated presentation.

- The role of the section analyzing the aircraft flight data is to determine aircraft movement when information is available from the FDR. This section shall gather sufficient information in a usable form from cockpit voice recordings, flight information recordings, radar recordings, in-flight communications, photographs, and video recordings, and produce animated data showing aircraft movement with the aid of the recorder data in order to identify various events.

- Dedicated software shall be used to create simple animation. Some parts may be displayed on a video screen. This type of display is useful to operational investigators. The purpose of this format is to prepare the report in an orderly and standardized manner.

- Aircraft time shall be calibrated with very high accuracy. Most recording devices also use a highly accurate GPS time source. Analog systems use a digital time signal recorded on a dedicated numbered channel. Airline or control personnel should check time calibration daily. This shall be verified as part of the investigation. Times from different sources (en-route, approach, tower, etc.) shall be synchronized.

- When preparing a report on recorder readout, the report format in Attachment C to Annex 13 and Part 4 of ICAO Doc 9756 shall be followed. This is contained in Attachment C, which also provides more detailed information on the material relevant to each section of the final report.

- In the event of any discrepancy between the Mongolian and English versions of this accident analysis report, the Mongolian version shall prevail. (This sentence shall be added when the report is translated into English.)

2.18. Laboratory examination of the aircraft recording device

- Before readout begins, the recorder specialist shall examine the recording device, determine whether it can be handled under the conditions of the laboratory and whether the transmission cable and software are suitable, and make a conclusion and decision in accordance with this procedure.

- If there is major damage, if copying the recording is considered impossible, or if equipment to disassemble and closely examine the recording device is unavailable, the device shall be sent to a suitable organization for examination. Before arranging such services, the following shall be considered.

- perform the work with the assistance of investigation laboratories of foreign organizations conducting similar activities;

- carefully assess any possible conflict of interest when selecting such services;

- if disassembly of a flight recording device is required for examination, all aspects of the device shall be carefully photographed before the work begins, the disassembly process shall be video-recorded, and a record of the disassembled items shall be kept and authenticated;

- provide an accurate history of the recording device, including the following information.

- place of manufacture

- serial number

- part number

- date installed

- date placed in service

- place where maintenance and certification were performed

- date maintenance and certification were performed
- time elapsed since overhaul and inspection
- other necessary information

- Other relevant parts and components of the recording device, including electrical mounting bases and cables, may be attached and provided together with it.
- The recorder specialist receiving the device shall strictly maintain confidentiality and be responsible for its safe custody and protection until it is returned to the owner.
- When the recording device is no longer needed for readout operations, it shall be returned at the request of the owner or operator and the necessary measures taken.
- The return of the recording device shall be documented in writing and the owner or operator shall sign for receipt. (Attachment 1)

THREE. INVESTIGATIVE USE OF AIR TRAFFIC CONTROL (ATC) VOICE RECORDINGS

3.1. Investigators of the competent authority conducting the investigation shall request ATC voice recordings for use in the investigation.

3.2. Voice recordings between air traffic control and the aircraft pilot shall be handed over against signature using the form shown in Attachment 2.

3.3. ATC voice recordings shall be copied from the original and taken in file form on removable media (CD, tape, flash drive, ZIP disk, floppy disk). The recording type shall be audio.

3.4. AAIIB investigators shall listen to the original ATC recording (which may be a digital recording taken from a tape or hard disk drive).

3.5. Organizations generally record from wires connected to headsets at control positions. If any question arises as to what was transmitted or received by the radio system, it may be necessary to consult aviation technicians to determine whether other recording points existed and whether they recorded during the occurrence. Although rare, discrepancies may arise when two recordings are compared.

3.6. Observe the time counter to ensure there are no gaps between recordings. Compare the original transcript against the recording to verify that your working copy is correct. If the timing differs by more than 1 or 2 seconds, notify the organization responsible for the recording. If the timing has not been corrected on the authenticated transcript, explain this in your report. Although it is advisable to keep a working copy of the cassette previously provided, you must listen to the original ATC tape. Authenticated duplicate recordings may be stereo recordings with time on one channel and audio on another, whereas working copies usually use only a single audio channel.

Required air traffic control documents

3.7. The AAIIB shall obtain from the Air Traffic Services unit the ATC documents required for the investigation.

3.8. ATC documents shall be obtained in order to establish the provision of air traffic control services to the aircraft involved in the occurrence and the related evidence. Such documents shall be assembled and authenticated using the form shown in Attachment 2.

3.9. Recording and preservation of communications between the air traffic controller and the aircraft pilot shall be carried out in accordance with the ATC voice recording section of the Aircraft Accident and Incident Investigation Manual.

3.10. Authenticated transcript. A partial transcript is sufficient only to cover the frequencies used by the aircraft before the accident. A full transcript shall be requested in order to identify the frequencies used during the accident. A partial transcript includes

only the conversations between ATC and the aircraft involved, and any persons on the relevant telephone lines, whereas a full transcript includes all conversations on the relevant recordings.

3.11. Copies of statements shall be obtained from persons who had direct responsibility for controlling or communicating with the flight, or who prepared or handled information relating to the flight, witnessed any part of the flight operations, participated in emergency measures following the accident, or provided weather information to the flight crew within 24 hours before the accident. Statements shall be taken from the supervisor on duty at the time of the occurrence.

- Copies of all notes used by the controller during the occurrence, flight progress strips, notebooks, forms, memoranda, and the relevant chapters of organizational orders and duty descriptions.
- If on-the-job training was in progress, copies of organizational orders regarding the training and certificates showing that the instructor met requirements, as well as copies of training evaluations relevant to the occurrence.
- Organizational layout diagram.
- Relevant documents between the air traffic service organization and other organizations and carriers.
- Copies of duty rosters and the authorized personnel on duty at the time of the occurrence.
- Copies of all NOTAMs relevant to airport operations and equipment status on the day of the accident or incident.
- Copies of all SIGMET, AIRMET, CWA, significant weather information, airport weather forecasts, and weather observations relevant to the day and time of the occurrence.
- Documents on facility equipment status.
- Facility maintenance logbooks.
- Previous-flight NAVAID checks, where required.
- Post-accident flight inspection report.
- Copies of procedures for handling equipment, including diagrams held by the air transport organization if equipment-handling procedures are included.

3.12. Investigators of the competent authority conducting the investigation shall interview relevant personnel in accordance with the AAIIB Aircraft Accident and Incident Investigation Manual.

3.13. The ATC section report shall include conclusions on the work performed, copies of relevant audio transcripts, aircraft movement radar plots, controllers' statements, and copies of relevant organizational records.

Time source

3.14. Radar time shall be calibrated by a highly accurate GPS time source. Most digital audio recording equipment also uses a highly accurate GPS time source. Analog systems use a digital time signal recorded on a dedicated numbered channel.

3.15. The organization responsible for technical maintenance or air traffic personnel shall check time calibration at least twice a day. This shall be verified during the investigation. Times from different sources (en-route, approach, tower, etc.) shall be synchronized.

3.16. Air traffic communications recordings

a) Air traffic service voice recordings are widely used in accident investigations, and assistance may be obtained from personnel familiar with the relevant procedures or with voices recorded on tapes. Most ATS recording equipment records simultaneously on

many frequencies and channels. Recordings may exist from company movement control, airport service frequencies, and surrounding ATS organizations. Some commercial radio stations continuously monitor a range of frequencies, including aviation and accident/disaster radio frequencies, in search of newsworthy events; the advantages of such recordings should be explained to anyone assisting the investigation in this respect.

b) Voice recordings are commonly used to analyze signs of stress in personnel, and frequency spectrum analysis can reveal indications of engine, gear, rotor speed, gear disengagement, or explosions. Even if no recordings have been made on a tape for a long period, all recordings relevant to the accident should first be listened to. Audio tapes are fragile and, because they are magnetic, are easily damaged or erased. Therefore, they should be handled only by trained personnel. When transporting magnetic tapes, the container shall be marked "Keep away from heat and magnetic sources."

FOUR. PRESERVATION AND PROTECTION OF RECORDING DEVICE RECORDINGS, AIR TRAFFIC CONTROL VOICE RECORDINGS, AND DOCUMENTS

4.1. In the event of an accident or serious incident, all recordings, recording device data, air traffic services communication recordings, and documents that may relate to the flight shall be protected and preserved until instructions are received on their further disposition.

4.2. Flight data recordings (FDR), cockpit voice recordings (CVR), air traffic services recordings (ATC), and related documents from accidents and serious incidents shall be preserved in written and electronic form in the AAIB storage and archives.

4.3. For as long as necessary, the AAIB shall protect and maintain custody of aircraft recording devices and their recordings, including protecting them from further damage, unauthorized delivery or access, theft, and deterioration.

4.4. Where necessary, records and confidentiality logs concerning recordings and related documents shall be maintained before, during, and after the investigation.

4.5. To prevent loss of evidence and for documentation purposes, photographs of the recording devices shall be taken, their manufacturer serial numbers and models recorded, and a register maintained.

4.6. The aircraft operator shall preserve recordings of flights performed during the previous 12 months. This makes it possible for investigators conducting the aircraft investigation to obtain and analyze previous flight data if an accident or incident occurs.

4.7. Each recording device shall bear a label showing its name, part number, serial number, and the name and address of the operating organization. The recorder specialist shall keep a list, description, and photographs of the recording devices from which aircraft data are to be obtained. They shall be stored in a secure location until returned and transported back.

4.8. During transport, recording devices shall be packed to minimize damage and placed in specially marked boxes protected by suitable packaging material against external effects, magnetic fields, and static electricity.

4.9. The recorder specialist shall properly label all boxes and containers and prepare an itemized list for each one.

4.10. Documents, notes, and related files produced from the flight data readout shall be kept by the official responsible for readout operations within the organization, and the results shall be recorded, noted, and archived.

4.11. Confidential recordings and documents shall be marked with a security classification and registered and preserved in accordance with the form in Attachment 3.

4.12. The security of voice and video recordings shall be protected and stored in a separate, secure room.

Return and destruction of recordings and documents related to aircraft accidents and incidents

4.13. Once the investigation of the aircraft accident or incident has been completed and the final report issued, the related recordings and documents shall be returned to the owning organization.

4.14. When it is necessary to return the cockpit voice and video recording equipment of a protected aircraft, the recording shall be encrypted or overwritten.

4.15. Recording devices, data-storage media containing recordings, and related documents shall be returned to the owner or operator against signature and documented in writing using the form shown in Attachment 2.

4.16. Recordings and documents that do not need to be returned shall be stored in the AAIB warehouse for 5 years after issuance of the final report. After that, they may be destroyed by decision of the Head of the Bureau.

**HANDBOOK TABLE FOR RECORDING DEVICES AND RELATED DOCUMENTS
HANDBOOK FORM**

| Owner | Aircraft manufacturer and model | Aircraft registration mark | Flight number | Category |
|------------------------|---------------------------------|---|---|----------|
| | | | | |
| Location, Flight route | Date, time | Delivered by: | | |
| | | Recording device (Model, P/N, S/N) | Documents | |
| | | | | |
| Flight crew notes | | Code (flight type, phase, factors affecting the flight) | Notes (basis, accident/incident information, cooperation agreement, instructions) | |
| | | | | |

I hereby confirm, in accordance with the rules of the Aircraft Accident and Incident Investigation Bureau, that I have delivered the above recording device and related documents to the Bureau.

Owner or owner's representative:

(signature) Full name _____ / _____ /
Address _____
Phone: _____

Received by:

(signature) For the AAIB: Name _____ / _____ /
Date received: _____

I hereby confirm, in accordance with the rules of the Aircraft Accident and Incident Investigation Bureau, that the above recording device and related documents (_____)

have been returned to the owner and operator because the investigation has been completed.

For the AAIB: Name _____ / _____ /
(signature)

Received by:

Owner or owner's representative:
(signature) Full name _____ / _____ /
Address _____
Phone: _____

Date returned: _____

VOICE RECORDINGS AND RELATED DOCUMENTS
HANDOVER FORM

| Owner | Aircraft type | Flight number | Registration mark | Occurrence category |
|---------------------------|---------------|-----------------|-------------------|---------------------|
| | | | | |
| Location | Date | Delivered by | | |
| | | Voice recording | Documents | |
| Name of document provided | | Code | Notes | |
| | | | | |

I hereby confirm, in accordance with the rules of the Aircraft Accident and Incident Investigation Bureau, that I have delivered the above voice recordings and related documents to the Bureau.

Owner or owner's representative:

Full name _____ (signature) _____

Address _____

Phone: _____

Name of receiving AAIB official: _____ / _____ /
(signature)

Date received: _____

I hereby confirm, in accordance with the rules of the Aircraft Accident and Incident Investigation Bureau, that the above voice recordings and related documents
(_____)

have been returned to the owner and operator because the investigation has been completed.

For the AAIB: Name _____
(signature)

Owner or owner's representative:

Full name _____ (signature) _____

Address _____

Phone: _____

Date returned: _____

FLIGHT RECORDER READOUT CONTROL AND CONFIDENTIALITY REGISTER

| No. | Recording device, recordings, and related documents | Owner name and address | Date/Period | Confidentiality level | Signature of delivering person | Notes |
|-----|---|------------------------|-------------|-----------------------|--------------------------------|-------|
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | | | | | | |

FLIGHT RECORDER READOUT AND ANALYSIS CONTROL FORM

Purpose of the Form:

This form is used to plan, monitor, and document the readout and analysis of flight recorders, including the Flight Data Recorder (FDR), Cockpit Voice Recorder (CVR), and other relevant recordings.

I. GENERAL INFORMATION

Occurrence Number: _____

Date: _____

Aircraft Registration: _____

Investigator-in-Charge: _____

Organization / Laboratory: _____

II. CHECKLIST

No. Assessment Remarks Question Yes No

E.1.1 Was the readout and analysis of flight recordings organized as soon as possible after the accident/serious incident?

E.1.2. Was the need to evaluate temporary evidence at the accident site identified?

E.1.2.1 Was flight recorder information used early to guide the direction of the investigation?

E.1.2.2. Was sufficient basis established to issue urgent safety recommendations if required?

E.1.3. If domestic technical capability was insufficient, was assistance requested from another State with appropriate capability?

E.1.4. was the readout arranged promptly at a suitable organization or laboratory.

Unofficial translation of the regulation on AAll

E.2.1. Was the most suitable organization or State selected to support the investigation?

E.2.2. Was reliance solely on standard replay equipment/software avoided?

E.2.3. If the recorder was damaged, were special recovery techniques used?

E.2.4. Was it verified whether severely damaged recorders could be disassembled and recovered?

E.2.4.b Can original recordings or memory modules be read without manufacturer duplication equipment?

E.2.4.c Can raw binary wave data be manually analyzed?

E.2.4. Is software available for digital audio enhancement?

E.2.4. Is there capability to graphically analyze and verify data and calculate additional parameters?

E.3.1. Was the need for participation of the State of Design or Manufacture identified?

E.3.2. If analysis is conducted in another State, were representatives of the State of Design or Manufacture invited?

E.4.1. Were operational characteristics and regulatory information of the State of the Operator considered?

E.4.2. Was participation of the State of the Operator arranged?

E.5.1. Were FDR and CVR read out by the same organization?

E.5.2. Were requirements followed prohibiting opening or powering the device before copying the original data?

E.5.3. Was the organization conducting the readout given the opportunity to comment on the draft final report?

E.5.4. Was technical support from the manufacturer or operator obtained if necessary.

E.5.5. Was the need to preserve original recordings or copies until the investigation is completed determined?

E.5.6. Does the organization storing the recordings have adequate security and protection procedures?