Foreword

Ethiopia is a signatory to the Convention on International Civil Aviation (Chicago 1944) and a founding member of the International Civil aviation Organization (ICAO). In line with Article 26 of the Convention, the Ethiopian Government launched an investigation into the accident that occurred to PANH helicopter flight 9797, a Mi-8MTV-1 type helicopter registered RA-25497. The Ethiopian CAA appointed an Investigation Committee (IC) and an Investigator in Charge (IIC). The State of Design, Manufacturer, Registry and Operator invited to appoint accredited representatives to the IC.

A Preliminary Report delivered to ICAO, Ethiopian CAA and Ministry of Transport and to the state of Registry on August 7, 2013.

In accordance with Annex 13 to the Convention and with the Ethiopian Accident investigation Regulation, the investigation is not to apportion blame, or to assess individual or collective responsibility.

Consequently, the sole objective of this investigation to this accident is to establish what happened, to analyze how and why the occurrence took place, and from this analysis to determine what the occurrence reveals about the safety health of the aviation system. Such information used to arrive at conclusions and make safety recommendations aimed at drawing lessons from what happened in order to prevent similar reoccurrences, and where appropriate, to increase the overall safety of the aviation system. Furthermore, the use of this report for any purpose other than for the prevention of future accidents could lead to erroneous interpretations.

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Abbreviations

ACC	Area Control Centre
AD	Airworthiness directive
AOC	Air operators certificate
ATPL	Airline Transport Pilot License
CB	Thunder storm
CPL	Commercial pilot license
CRM	Crew Resource Management
CRS	Certificate of release to service
CVR	Cockpit Voice Recorder
DCGA	Directorate General of Civil Aviation
DFDR	Digital Flight Data Recorder
FLM	Flight level management
HAAB	Addis Ababa /Bole Int.
HDAM	Djibouti Int.
IC	Investigation committee
IIC	Investigator in charge
IFR	Instrument flight rules
MEL	Minimum Equipment List
MET	Meteorology
METAR	Meteorological Airport Report
MP	Maintenance procedure
PF	Monitoring pilot
RCAA	Russian Civil Aviation Authority
SOP	Standard Operating Procedure
UTC	Coordinated universal time
VFR	Visual flight rules
VHF	Very high frequency

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HELICOPTER ACCIDENT INVESTIGATION REPORT

Mi-8 MTV (RA- 25497)

July 31, 2013

Synopsis

Date of accident: 31.07.2013	**Helicopter:** MI-8MTV-1
	Registered: RA-25497
Site of accident: N008°59'43" E039°09'11"	**Owner:** JSC "Krasnodar-Leasing-Consulting", Krasnodar, Russia
Type of flight: Ferry Flight	**Operator:** PANH Helicopters, Krasnodar, Russia
	Persons on board: 4

Injuries	**Crewmembers**	**Passengers**	**Others**
Fatal			
Serious	3		
Minor		1	

Executive Summary

On July 31, 2013, approximately at 04:31 UTC, Russian registered Helicopter Type and model Mi- 8 MTV, Registration Mark RA 25497, owned and operated by PANH helicopters took off from Djibouti with another Mi-8 MTV-1, Registration Mark RA-25114 helicopter to Juba South Sudan for UN mission, and make technical landing at Addis Ababa Bole International Airport.

The helicopter took off with three-flight crew (Captain, first officer and flight engineer), one passenger and a total payload of 640kg. The weather condition during takeoff was T=26^{o}c, P=762mm, wind direction 120^{0}wind speed 2-3km/hr and airport altitude=17m.

At about 07:40 UTC, the Ethiopian DGCA was informed the crash of Mi-8 helicopter which departed from Djibouti near the place called Chefe Donsa east of Addis Ababa.

The helicopter crashed with its nose section, causing series injury to all crew and a passenger. As soon as the crash heard the Ethiopian Civil Aviation Authority Search and Rescue, operation quickly deployed to the crash site. In collaboration with Ethiopian Air force and district of the accident zone, the local people and police around the area highly assisted the crew to evacuate from the crashed helicopter.

Subsequently, all the four crews and a passenger rescued by Ethiopian Air force helicopter and brought to Addis Ababa Bole International Airport, and taken to Balcha Hospital with Ambulances. The helicopter substantially damaged. There was no fire.

Organisation of the Investigation

On 31st July 2013 at around 07: 40 UTC, the Ethiopian DGCA was informed the crash of Mi-8 helicopter which was departed from Djibouti and destine to Juba South Sudan, for United Nations Mission and to make technical landing at Addis Ababa Bole International Airport. The helicopter crashed near the place called Chefe Donsa east of Addis Ababa.

Following the information, that the helicopter has crashed, the Ethiopian CAA launched a technical investigation. In accordance with article 26 of the Convention and ICAO Annex 13 "Aircraft Accident and Incident Investigation", an Investigation Committee (IC) was formed by Ethiopian Civil Aviation Authority (ECAA) in order to conduct the technical investigation. An investigator-in-charge (IIC) was designated in the same decree to lead and initiate immediately the investigation. As per Annex 13 provisions, the Russian Federation as State of Design, Manufacture, Operator/ and Registry, were invited to appoint accredited representatives and to be associated with the IC.

The Investigation Committee composition was as follows:

Ethiopia – State of occurrence

Russian Federation – State of Design, Manufacture, Operator/and Registry

A Search & Rescue (SAR) team was formed by ECAA in conjunction with the Ethiopian Air Force. The Search & Rescue operations were conducted in full coordination with the IC including local people of the district.

As per the international standard recommendations and practice the FDR and CVR were read at the Inter State Aviation Committee facilities in Moscow. Both recorders transported directly to the Inter State Aviation Committee facilities under the custody of the State of occurrence accompanied by members from the IC and readings were performed in association with and under the direct supervision of the Investigation Committee. It was also decided that media relations untill the release of the final investigation report were to be handled by the ECAA with factual data and information relayed through the IIC directly to the ECAA.

1. Factual Information

1.1 History of the Flight

On July 31, 2013, Russian registered Helicopter Type and Model Mi- 8 MTV, Registration Mark RA 25497, owned and operated by PANH helicopters departed from Djibouti with another Mi-8 MTV-1, Registration Mark RA-25114 helicopter to Juba South Sudan, for United Nations Mission and make technical landing at Addis Ababa Bole International Airport.

The helicopter took off with three-flight crew (Captain, first officer and flight engineer), one passenger and a total payload of 640kg.

The weather condition during takeoff was T=26^{o}c, P=762mm, wind direction 120^{0}wind speed 2-3km/hr and airport altitude=17m. Maximum takeoff weight of the helicopter was 11,915kg and center of gravity +117m.

After takeoff the helicopter-increased altitude nearly 2600m and performed normal flight for about 2:12 hrs. Within this time, there were variation of altitude and speed 2600-2650m and 120-190km/hr correspondingly. From flight information, factual data and forecasted weather conditions there were considerable changes in flight parameters for about 43 minutes.

During the flight both helicopters were communicating with the ATC, and nothing abnormal conditions reported from crews.

At 03:16:46hrs, the helicopter descended from 2600m to 2300m, and according to the flight map the altitude of the crash site suppose to be around 2400m.The altitude indicator in the cockpit (A-037) the dangerous altitude was settled at 50m but this might not be correct because there was impact and rescue operation which can affect the indicator.

According to the reports from the pilots of both helicopters, when they approach to Bole International Airport, the ATC advised them to make orbit on their position. |Because of the weather the pilot of the RA-25497 decided to make a slight decent to avoid collision with the leading helicopter. Upon this altitude, the pilot periodically used IFR and VFR, finally, when the visibility improved he tried to manage controlling his position with the reference to make forced landing in case of emergency and if possible to land on planned airport.

As it read from flight parameters, when the helicopter approached to Bole International Airport the altitude was within 1830-2560m. At 03:18:19-03:19:19, he executed left orbit with bank angle up to 20^0 then from 03:19:19-03:20:07, right orbit with bank angle up to 19^0. At the end of right orbit, there was a left bank up to 10^0after, which the bank angle of the helicopter was zero. At this moment, the other flight parameters read pitch angle =5.3^o main rotor blades RPM=97%, collective pitch =5.8%, speed of the helicopter ≈ 110km/hr and altitude=2300m.

As it advised to continue approach, the pilot started ascending and at one moment, he lost control of the instrument. He increased pitch, which decreased the speed and increased the vertical speed of descent. The remaining altitude and poor reaction of the helicopter to the cyclic pitch control (According to the information from crews the remark with lateral channel of the autopilot) did not allow to correct the error. As a result, the pilot ordered the crew to be ready for forced landing.

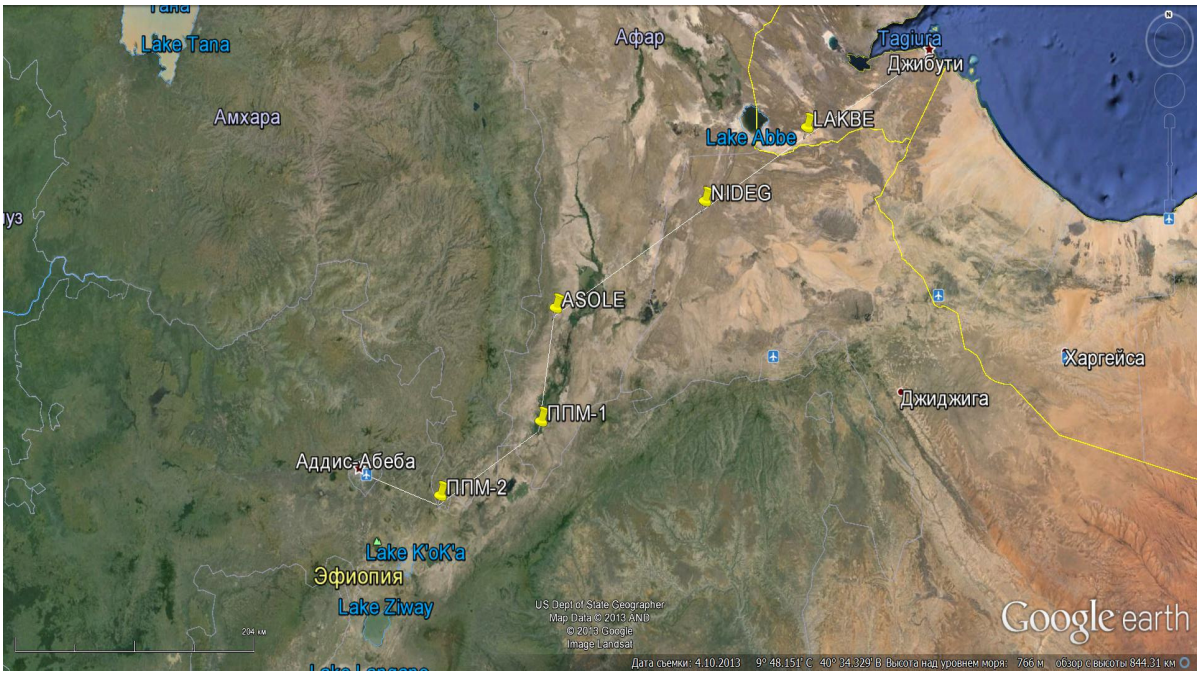


Fig1 en- route flight

After 2:56 hours of flight, at about 07:40UTC while approaching to Addis Ababa Bole International Airport 35 km East of Addis Ababa the helicopter crashed in to a farm land at N 0085943, E 0390911 Coordinate.

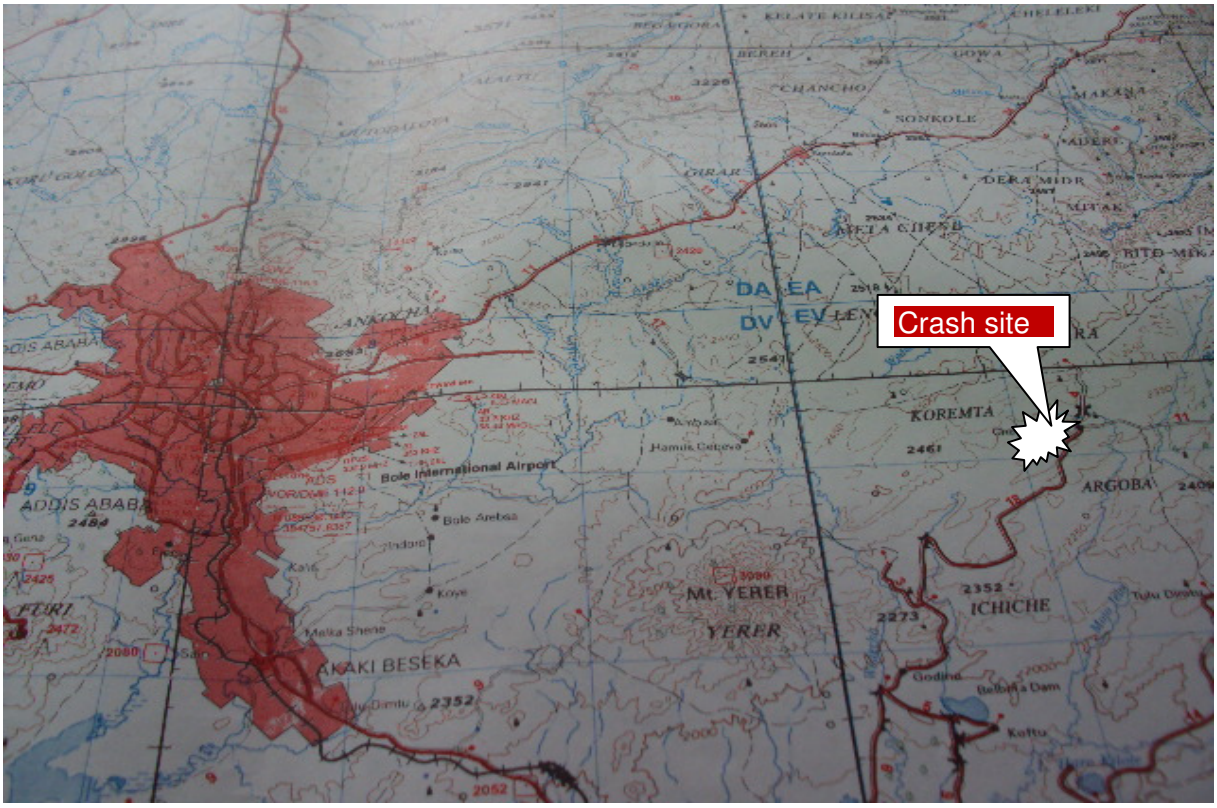


Fig-2 Helicopter crash sight

The helicopter crashed with its nose section, causing series injury to all four crew. In collaboration with Ethiopian Air force and district of the accident zone, the local people and police around the area highly assisted the crew to evacuate from the crashed helicopter. As soon as the event heard, the Ethiopian Civil Aviation Authority Search and Rescue operation quickly deployed to the crash site.

Subsequently, the crew and a passenger rescued by Ethiopian Air Force helicopter and brought to Addis Ababa Bole International Airport and taken to Balch Hospital with Ambulances. The helicopter encountered significant damage and but there was no fire.

Ethiopian Civil Aviation Authority following the accident established an investigation committee, headed by the Accident Investigation Bureau to investigate the root cause of the accident.

1.2 Injuries to Persons

Injuries	Crew members	passengers	Others
Fatal			
Serious	3		
Minor		1	

1.3 Damage to Helicopter

The helicopter suffered with substantial damages.



Photo-1 damaged helicopter

1.4 Other Damage

The Farmland ready for crop at and surrounding the crash site damaged.

1.5 Personnel Information

The flight crew consisted of the captain, first officer and the flight engineer certified in accordance with the RCAA requirements

1.5.1 Pilot–in-Command:

Sex ..... Mail
Age.....47
ATPL number.....I П № 007384
Medical expiry date.....17.04.2014
Total flight hours.....7911
Hours last 90 days.....78:41hrs
Hours last 30 days.....28:16hrs
Hours last 7 days .....3:56 hrs
Last flight.....2:56 hrs

1.5.1.2 First Officer:

Sex .....Male
Age.....45
ATPL number.....P № 000139
Medical expiry date.....03.10.2013
Total flight hours.....2636
Hours last 90 days.....6:41 hrs
Hours last 30 days.....6:41 hrs
Hours last 7 days.....6:41 hrs
Last flight.....2:56 hrs

1.5.1.3 Flight Engineer:

Sex .....Male
Age 46
FML number.....III БМ № 000433
Medical expiry date.....11.07.2014
Total flight hours.....2824
Hours last 90 days.....53:56hrs
Hours last 30 days.....15:31 hrs
Hours last 7 days.....6:51 hrs
Last flight.....2:56 hrs

1.6 Helicopter Information

The helicopter manufactured by Kazan Helicopters Company and found Airworthy as of the day 31.05.1991. It went into service the same year, and had been issued with Registration No 2848 and the Certificate of Airworthiness No.2.16.2.13.0062 by Russian Federation Civil Aviation Authority and renewed on 18.07; 2013.The helicopter had maintained in accordance with approved maintenance schedule. The last 50 hrs inspection done on 29 July 2013 that was valid at the time of the accident. The helicopter total time since last overhaul for the airframe, engine gearbox and rotor blades were 1272:44 hours.

Basic weight (7248 kg) and Balance (– 55,7mm) checked on 15.07.13 by the company and released for further operation.

1.6.1 Airframe

Manufacturer	Kazan Helicopters
Type	Mi-8MTV-1
Serial number	95642
Entry into service	31.05.1991
Certificate of registration	Russia
Registration	RA-25497
Certificate of Airworthiness	№ 2.16.2.130062
Utilization until 31 July 2013	3105:48 hrs

1.6.2 Engine # 1

Manufacturer	Motor Sikh
Engine Type	TV3-117VM
Serial number	7087883200003
Engine time since new	2781:56hrs
Engine time since overhaul	1275:56hrs

1.6.3 Engine # 2

Manufacturer	Motor Sikh
Engine Type	TV3-117VM
Serial number	7087883200004
Engine time since new	2781:56hrs
Engine time since overhaul	1275:56hrs

1.6.4 Main gear box

Manufacturer	Redactor-PM
Type	VR-14
Serial number	1040141103073
Gear box time since new	4288:56hrs
Gear box time since overhaul	348:56hrs

1.6.5 Rotor Blades

Manufacturer	Kazan Helicopters Company
Propeller Type	8AT -2710-00
Serial number	1ТЭ4(3-7) 427
Propeller time since new	282:56hrs

1.6.6 Weight and Balance

On 15 July 07.13 basic helicopter weight and balance checked by the company and released for further operation.

1.6.7 Condition of the Helicopter before Departure

Daily check completed prior to the first flight of the day ОВ + $ОВ_1$ т/с № 1719 and included routine check of the serviceability of the helicopter for the day's flight. No defect or deferred maintenance item reported on the technical log after the arrival and before it released for the second flight. Take off roll was normal.

1.6.8 Maintenance Operations Follow-up

The last maintenance record examined within the framework of the investigation and conducted major maintenance inspection (F-1 /50hrs) since the acceptance of RA-25497 to the fleet on 07.10.2010. The major maintenance inspection (50hrs) conducted on 29.07.2013 at helicopter time of 1275:40 hours. The engines logbooks, airframe and engines airworthiness directives (AD) status also examined and did not reveal any significant anomalies.

1.7 Meteorological Information

The Investigation Committee reviewed data from National Meteorological Service that was collected on 31 July 2013. The data revealed light rain conditions in the area at the time of the accident. Relevant meteorological documents are included in Appendix of this report.

1.7.1 General Meteorological Situation

At the time of the accident, east and north east of Addis Ababa there was mist on the localizer path for runway.

1.7.2 Local Meteorological Situation

The meteorological condition at the airport was fair and the surface wind recorded at the time was calm, light rain over the area and visibility > 10 km. Cloud base was recorded as 2000'. METAR and TAFOR reports indicated significant meteorological conditions were in the area East and North East of the airport with isolated cloud beyond 10 km from the airport. The METAR Reports from arriving traffic at the time of the accident confirmed the reported meteorological conditions. However as it confirmed by the eyewitness from the local people the actual weather at the accident site was light rain, low cloud and mist.

1.8 Aids to Navigation

The Investigation Committee reviewed that all navigation aids were working; the primary and secondary radar checked for accuracy and found normal. There were no other abnormal conditions on navigation aids.

1.9 Communication

Flight 9797 has been in contact consecutively with the ACC on 125.1 and 125.2, the Tower controller (approach) also communicated on 118.1 all communication between Flight 9797 and the ACC and Tower on 125.1 and 118.1 were recorded by the ATC facilities and on the CVR and have been used to produce this report.

1.10 Aerodrome Information

Not relevant

1.11 Digital Flight Data and Cockpit Voice Recorder

In accordance with regulatory requirements, the helicopter was equipped with digital flight data recorder (DFDR) and Cockpit Voice Recorder (CVR).The DFDR and the CVR contained records of the entire flight information. Both recorders translated and transcript according to the required information.



Photo-2 DFDR & CVR

Cockpit Voice Recorder (CVR)

The CVR of the helicopter MIL Mi-8-MTV RA-25497 during the flight (on July 31, 2013) was servicable and recorded all the flight information related to the accident except the two minutes prior to the accident due to the record over writing after the reverse as per the CVR design.

The total record duration from the beginning of the helicopter preflight check is around three hours but the data record was noisy.

Results of the Research

CVR P-503B the unit "Y3" of the CVR P-503B No. 930331 found in a slightly damaged condition. The cover of the unit has evidences of some mechanical impact. The cover is not sealed (photo 1)

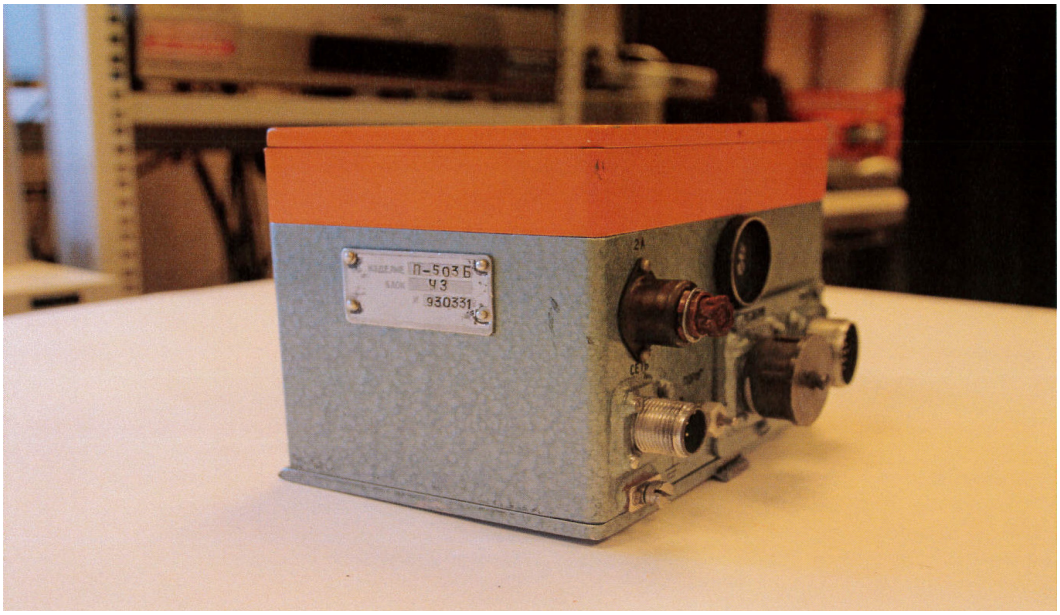


Photo-3 unit Y3 of the CVR P-503B

After opening the cover, it was discovered that the internal shield was detached and placed on the media reels. The pools and the wire found normal. The wire is set to the recording and play back assembly correctly

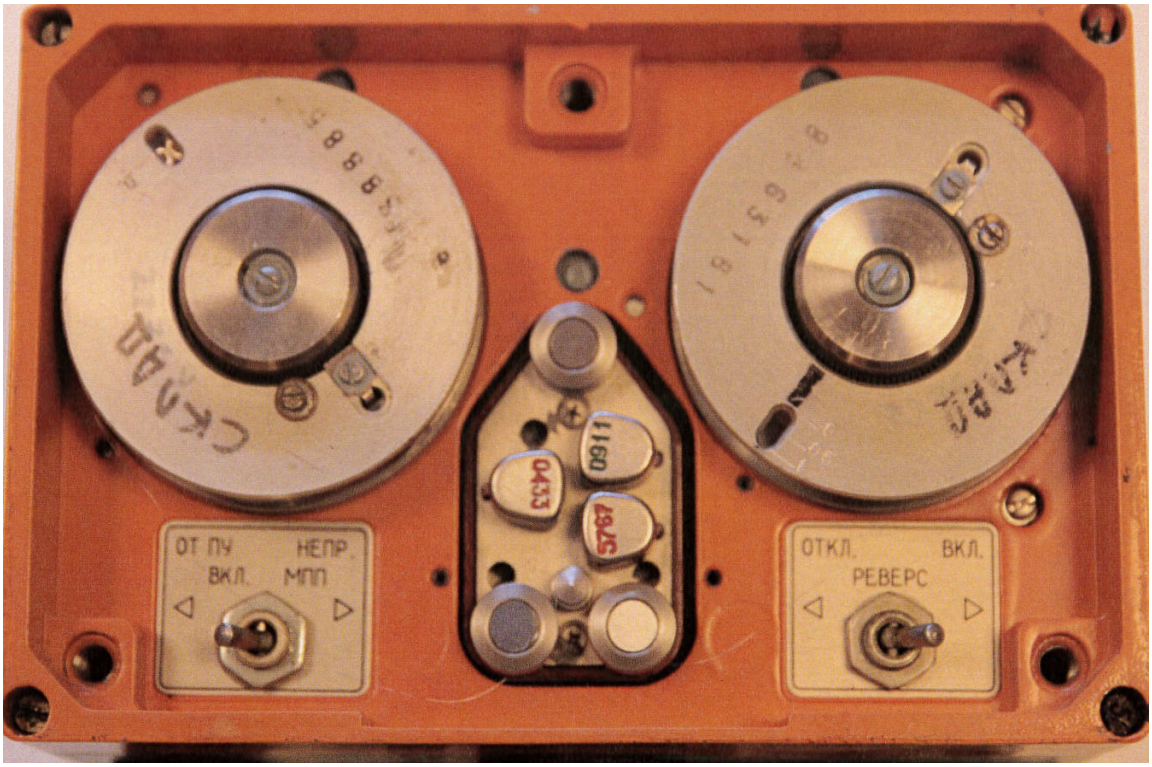


Photo 4 the cover opened

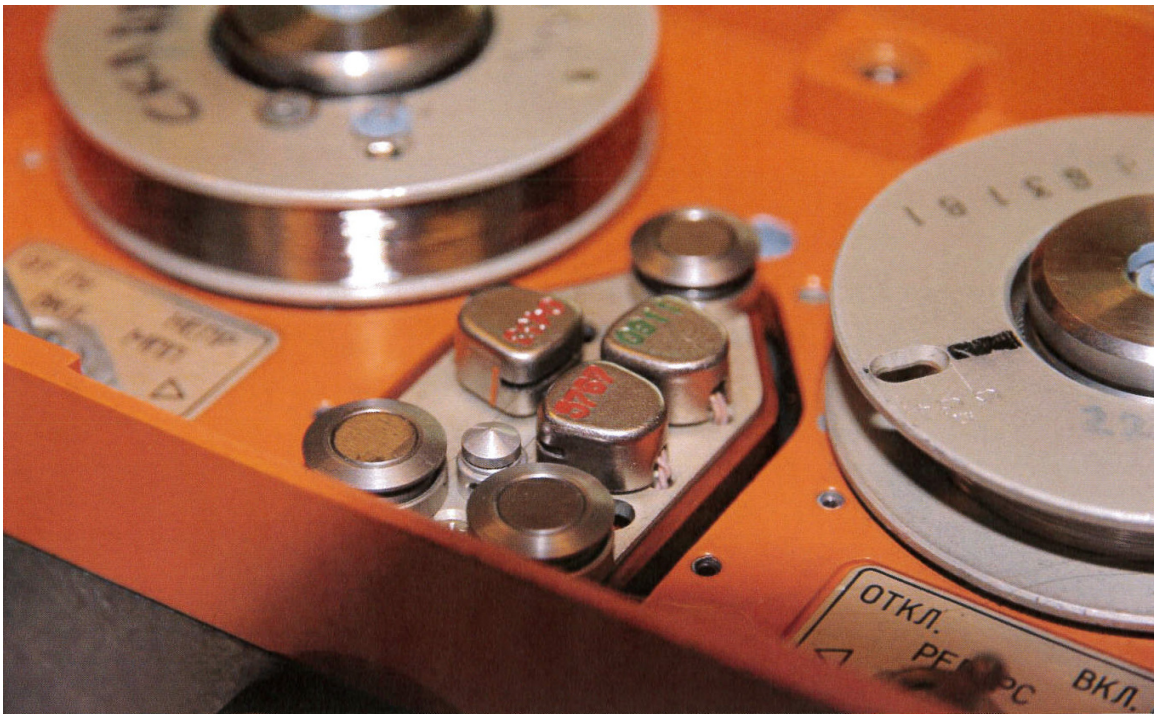


Photo-5 CVR P-503B record and play back assembly

CVR read out

The readout of the CVR conducted with the help of the P-504 ground station, and SAPFIR MAK hardware and software

The wire was rewind and then the copy of the CVR started from the moment of the preparation for the take off until the end of the wire. Totally three hours of the information was copied. The CVR information recovery and time synchronization planned to be with the help of the ATC transcript.

1.12 Wreckage and Impact Information

The helicopter suffered substantial damages. The main rotor, tail boom and tail rotor destroyed. The impact of the ground damaged the crew cabin and forward section of the fuselage. Lower frame elements of the fuselage from frame 1- 7 and cabin floor destroyed.



photo-6 Impacted Helicopter & wreckages

1.13 Medical and Pathological Information

The captain and first officer had undergone medical check and there was no abnormality until the time of the accident.

1.14 Fire

No fire

1.15 Survival Aspect

All crews survived with serious injury.

1.16 Test and Research

Not relevant

1.17 Organizational and Management Information

1.17.1. PANH Helicopters Air Operator Certificate (AOC)

PANH Helicopters has a valid AOC (Air Operators Certificate) # 69, issued on 11.03.2012 by Federal Air Transport Agency Ministry of Transport of Russian Federation, authorizing to perform commercial air operations and has a valid AOC # AP-16-12-66.The AOC issued on 13.02.2012 by Southern Interregional Territorial Federal Air Transport Agency Ministry of Transport of Russian Federation. The Mi-8MTV-1 helicopter RA-25497 properly endorsed into Operational Specifications dated 19.07.2013 without limitations. A copy of AOC and Operational Specifications attached as Appendix to this report.

1.17.2. History

In 1964, All Union Research Institute for Aviation Use in National Economy founded. The Company was specialized on design and development of modern means for air works with small airplanes and helicopters. There were many different appliances designed for power line construction, aerial firefighting, and crop spraying etc. The fleet had started from MI- 2, Ka -26, MI- 8 helicopters and An-2 airplane. All of the pilots had a test pilot qualification as production test pilot.

In 1992, the Institute transferred into private Joint Stock Company PANH Helicopters. Since the time, the company showed drastic commercial and economical growth. The new helicopters, like Mi-26T, Ka-32 and Mi-8MTV' set into fleet. The company is a member of Helicopter Association International from 1992, grooving with the new international projects in Burma, Turkey, Spain, Germany, and Papua New Guinea. Beginning from 2005 the company became an official carrier for UN WFP, Regional permanent carrier for Kuban Government and sole provider for forest firefighting services for Cyprus and Greece for the last twelve years.

1.17.3. Personnel Training and Authorization

According to the documents provided by PANH and interviews conducted from July 22-8 August 2013, all personnel involved in PANH 9797 trained and authorized as per the provisions of RCAA and COM.

1.17.4. Preparation of the Flight PANH 9797 in Djibouti

As it confirmed from documents and interviews from 01-22 August 2013 all documents required in accordance with PANH procedures provided to the crew prior departure from Djibouti. Weather reports were adequate for VFR flight conditions en route HDAM to HAAB. Preflight inspection check type OB+OB1 performed without

any deviations and failures.

1.17.5. Procedure for Thunderstorm and Heavy Rain Conditions

PANH provided procedure for flying during thunderstorm and heavy rain conditions. It stipulates in the COM Part A 16.18.1 "When approaching to thunderstorm or heavy rainfall conditions, the captain must evaluate to continue the flight or divert to avoid this area, coordinating the diversion with the ATC. Intentionally entering into CB (thunderstorm) and heavy rainfall area banned.

1.17.6. Procedure for Adverse Weather Conditions

PANH provided the procedure for flying when adverse weather conditions appear. In COM Part B 16.9.6, 16.14.1 and 16.16.1 says that, when the pilot approaches or enters to the adverse weather conditions, he shall:

- Avoid to enter the area with weather conditions below minima;
- Divert avoiding to enter and change the route to destination;
- Return to the departure aerodrome;
- Change to IFR flight;
- Find appropriate landing spot and land to wait until the weather condition becomes normal.

1.17.7. Procedure for Crew Interaction during the Flight

PANH provided SOP in COM where clearly describes crew responsibilities and interaction during the flight where one of the pilots acting as flying pilot (PF) and the other monitoring pilot (MP). It was stipulated at COM Part A 28 "the captain determines the assignment of PF and PM at the start of each flight as well as assignment for radio communication with ATC".

That was also determined in COM Part a 28.4 "The crew interaction and responsibilities on before landing in adverse weather conditions": "the co-pilot is monitoring the cockpit indication and responsible for that". In addition, prescribed MP shall "callouts when deviations from norm, if not positive response, than MP takes over".

1.17.8. Procedure for Use of Autopilot

PANH provided procedure to use autopilot that mentioned into FLM Mi-8MTV Para 8.16.2.3 and 8.16.2.4. The autopilot generally uses for attitude stabilization in all axis. "The pitch and roll mode should be ON before takeoff. In case of pitch channel failure, the pilot shall counteract the helicopter by means of cyclic pitch lever deflection.

1.17.9. CRM Training

PANH provided COM where CRM factor and CRM training identified – Para A34-P2 and Para D1-26. Its prescribed regular training in the company briefings as well as once three years every pilot shall process special CRM course in Training Center. "The captain shall cultivate ability to choose in emergency the optimum solution to finish flight without accident."

1.17.10. PANH Safety Program

During the investigation in Addis Ababa, the investigation committee verified that PANH has a Safety Program and SMS in place. The program includes essential elements like Accident Prevention Program, Quality Assurance program and the voluntary occurrence reporting system.

1.17.11. Maintenance Organization

In accordance to documents provided by PANH, the company is a FAP-145 Approved Maintenance Organization. It covers the full maintenance range from light to capital checks. The operator's maintenance program data, drawn upon the basis of the manufacturer's recommended maintenance program, it has approved by Russian CAA and subject to its oversight.

2. Analysis

General

On July 31, 2013 as the accident event notified to ECAA, the Accident Investigation Bureau deployed an Accident Investigation team and initially went to the crash site for gathering the required information to find the root cause of the accident. Since the helicopter crash site was quite far, it was difficult to reach on the same day. However securing the crash site by the police the go team travelled the next day to examine the wreckage parts of the helicopter. From the sight, the team gathered the relevant data and pictures to determine the cause of the accident and brought the Flight Data Recorder (FDR) and Cockpit Voice Recorder (CVR).

The investigation committee after gathering all the required data, assessments, and all the relevant records of the helicopter including the interview of the Pilot who involved in the accident and other witnesses information analyzed. All aspects and evidences that can cause the accident collected in accordance with Annex-13 and

Ethiopian CAA Accident investigation manual and procedure.

- The helicopter took off from Djibouti without any technical discrepancy. The documents received by flight crew prior to departure, including weather information were in accordance with the relevant requirements.
- The ATC were properly following up the flight and offering the necessary instructions until the helicopter failed from communication.
- The FDR analysis proved the change of parameters during approach shown on Fig-1 holding of constant speed of 110km/hr for 12 sec with minor pitch & roll deviations enables to conclude that within 03:21:27–03:21:39 the helicopter was stable enough to attain excess power to increase altitude if necessary.
- Considering the crash site altitude 2400m, accuracy of the barometric altitude as well as eyewitness and crews report, before the accident the flight performed between 80-100m above the ground.
- After 03:21:40, when the pitch up angle increased and speed decreased, the lifting power capability of the helicopter decreased due to aerodynamic and thrust forces. To restore this condition it was necessary to increase the power settings by using collective pitch. However, the pilot in command did not react to accomplish this input, keeping the value of collecting pitch lever at 7.3-7.5 and within (03:21:37 – 03:21:50) time. Such non-reaction of the crew with the collective pitch, led to loss of altitude.
- The further increase of pitch angle from 10.6^0 (03:21:48) to 17.2^0 (03:21:55) brought consequent decrease of airspeed up to 60Km/hr. (The lower level recorded by FDR). Since the collective pitch was increasing only from 7.5^0 (03:21:48) to 8^0 (03:21:55), the loss of altitude cannot be stopped.
- The increase of pitch angle up to 25^0 at 03:21:58 time and then its decrease $\approx 5^0$ at 03:22:04 time led to the stoppage of helicopter and decrease of speed to zero value.

- According to the flight manual when the engines are at take-off power setting, FIG 3.1.1 MTOW OGE graph shows Mi-8MTV-1 performance at 12,100 kg corresponds OAT = + 16 ^{0}C at H = 2400m. The actual weight of the Helicopter at the crash site considering the take-off weight of 11,865 kg at Djibouti and fuel consumption of 620 kg/hr equals: 11,865 kg - (620 Kg/hr x 2,77hr= 1717.4 kg) = 10,147.6 kg.
- The above data confirms that, if the helicopter, being in normal landing position, and

take-off power setting applied, it can have an excess thrust of 12,100 kg – 10,146kg = 1,954 kg. The pilot did not use the excess thrust on time, since the collective pitch was only on 8^0. This situation led to increased vertical descent of the helicopter.

- To gain the air speed, the pilot lately attempted to change the pitch attitude from ($+25^0$ (03:21:59) to -15^0 (03:22:08 crash into the ground) but he was not successful due to low altitude AGL.
- The gradual increase of collective pitch from 8.20^0 (03:22:03) up to 14.5^0 (03:22:08 impact the ground) was not effective due to rapid vertical descent, possibly in the "vortex ring" conditions.
- Based on the pilots reports, It is observed that the cause of the gradual increase of pitch angle up to 25^0 was due to piloting in limited visibility without effective use of the available COM-NAV equipment when crew disperse their attention to look outside the cabin in order to avoid collision hazard with the leading helicopter.

- According to the graph, the flight performed within 1830-2560m. At 03:18:19-03:19:19, the helicopter performed left orbit with bank angle 20^0, then from 03:19:19-03:20:07 right orbit with bank angle 19^0. At the end of the right orbit, they did left bank up to 10^0 after which the bank angle of the helicopter was zero. At this moment, the flight parameters were pitch angle 5.3^0, main rotor blade RPM=97%, collective pitch= 5.8%, speed ≈110km/hr and altitude 2300m.
- It is necessary to reveal that the flight into low speed range (100-35 km/hr) the static stability and reliability of the helicopter to be neutral or even negative it may lead to uncontrolled pitch increase and needs special piloting technique.

  If there is a minor, backward control input of the cyclic pitch (when the autopilot servo range used to "zero") it may cause unintended severe pitch up of the helicopter by itself. Normally when flying VFR, those zones pass fast and there is no special attention of the pilot need. The reserves of control enable the pilot to restore this misbalance and there will not be a negative effect of control.
- The crew due to their attention being outside did not control the moment of increasing the pitch angle, and consequent decreasing of airspeed to minimum (03:21:40).
- The emergency situation became complicated when the crew did not apply take off power setting in order to prevent uncontrolled descent and this probably led the helicopter into "Vortex ring" accelerating descent (03:21:58 – 03:22:04).

- The time interval with pitch angle increase with loss of speed (03:21:40) up to 50-60 km/hr (03:21:59) was 19 seconds. This means that the crew was having enough time to look at the indications of the flight parameters and take corrective action measures.
- The power capability of the helicopter (the speed and power reserve of the engines) could enabled the pilot to gain altitude, speed or change to IFR or perform forced landing.

  The pitch angle, which applied to keep from vertical descent at 03:22:02 time, was too late to correct from unnecessary landing. Holding this angle and correcting the collective pitch to its maximum rate could led to low vertical speed and safe landing of the helicopter.
- The analysis of the DFDR data and the examination of the helicopter wreckage, that the helicopter was airworthy and responding properly to the crew input.

3. Conclusions

3.1. Findings

- The accident was partially survivable due to absence of fire following the accident.
- In accordance with the Russian CAA requirements, the pilot and first officer licensed and medically fit until 17/04/2014 and 03/10/13 respectively
- The helicopter had a valid Certificate of Airworthiness and the last CRS (certificate of release to service) issued on 15 July 2013.
- The crews had received the required duty break before the accident. There was no evidence or conditions that could adversely affect the pilot's ability to conduct the flight.
- The FDR of the Helicopter during the emergency was serviceable and has recorded all the necessary parameters,
- The CVR of the Helicopter was also serviceable and has recorded all the essential information,
- The pilot in command employed VFR when flying at low altitude with limited visibility and used IFR without having good visual contact with ground objects, as a result of which he could not be able to hold the necessary pitch angle and speed as well as the corresponding engine power setting which further resulted in loss of altitude with high vertical descent speed unplanned and unsafe approach to the

ground;

- The crewmembers having enough time did not detect the deviations of the flight parameters and inform to the pilot in command on time.
- The in-correct piloting activities of the pilot with high vertical down ward and low for ward speed with limited visibility led to unsafe approach of the helicopter to the ground.
- The situation became complicated due to the possible entry of the helicopter in to a stalling circle between 03:21:58-03:22:04 hrs.
- The pitch angle that was at landing position and use of collective pitch to maximum could have led to safe landing of the helicopter.
- The lifting force of the helicopter (the speed and thrust reserve of the engines) could enabled the pilot to gain altitude to hover or make forced landing.
- The increase of pitch angle up to 25^0 (03:21:59) and then its decrease $\approx 5^0$ (03:22:04) could bring the helicopter to hover if the necessary power setting was applied.
- The last FDR record on flight parameters proved that the helicopter was not in landing configuration during the impact.
- The misbalances of the helicopter in pitch mode is due to the flying of the helicopter for a long time with a speed of (100-35) km/hr, which makes the static stability of speed to be neutral or even negative and needs special piloting technique.

3.2 Probable Cause of the Accident

The investigation committee analyzed and revealed that the most probable causes of the accident were:

- The pilot's unfamiliarity with the area,
- Very low flying and
- Lack of inadequate procedural flight observation

3.3 Contributing factor

- ✓ Light rain, low cloud and mist conditions in the area at the time of the accident.
- ✓ According to the information from the crews the remark with lateral channel of the Autopilot, poor reaction of the helicopter to the cyclic pitch

the pilot did not allow to correct the piloting error.

4. Safety Recommendation

- ✓ Carry out training (with hood) or situations of real limited visibility with the aim of understanding the peculiarities of piloting a Helicopter in the lateral channel with (without) switch the auto-pilot within neutral and negative speed integrity by recording all parameters using available records.
- ✓ The result of the training and if necessary amend the corresponding chapters of the flight operation manual as well as the pilots training program with conditions of limited visibility.

List of Appendices

Appendix A: PANH Air Operator Certificate (AOC)
Appendix B: Meteorological Data
Appendix C: Lay-out of flight path
Appendix D Radio Com. Permit
Appendix E: FDR Read-out Data
Appendix F: CVR Data Transcript
Appendix G: Testimonies of the crew near the flight
Appendix H: Medical Report
Appendix I: Comments by Russian on the Final Investigation Report

СИСТЕМА СЕРТИФИКАЦИИ В ГРАЖДАНСКОЙ АВИАЦИИ
РОССИЙСКОЙ ФЕДЕРАЦИИ

СЕРТИФИКАТ СООТВЕТСТВИЯ

CERTIFICATE

№ 2021130266

Настоящим удостоверяется, что **ОАО НПК "ПАНХ"**
This is to certify that

(наименование сертифицированного юридического лица и его адрес, или сертифицированного объекта)
(name of certifying organization and business address)

Юр. адрес 350000, Краснодарский край, г. Краснодар, д. 138/д. 121 по ул. им. Кирова/ул. им. Буденного

и его местонахождение, принадлежность)

Место пр. деятельности г. Краснодар, аэропорт "Пашковский"

соответствует требованиям законодательства Российской Федерации по гражданской авиации и ему дается право производить техническое обслуживание авиационной техники в соответствии с Приложением к настоящему сертификату.

Сертификат действителен только для названной организации и только по месту ее производственной деятельности и действует только совместно с Приложением, в котором указаны типы авиатехники и виды обслуживания.

meets the requirements of Russian Civil Aviation Laws and is empowered to operate the civil aeronautical products maintenance under limitations contained in the attached Appendix.

This certificate is valid only for named Maintenance Organisation, only for Organisation location and only in connection with the Appendix to this Certificate listing the kinds and types of aeronautical products.

Срок действия сертификата установлен до **26 июля 2015** года.
Valid to

Руководитель Начальник Управления поддержания летной годности
Head of

(наименование органа по сертификации)
(name of Certification Organ)

воздушных судов

Сертификат зарегистрирован в Государственном реестре Системы сертификации в гражданской авиации Российской Федерации
за № 2021130266

М.П.

Дата выдачи **26.07.2013**
Date issued

(подпись)
(Signature)

М.В. Буланов
(инициалы, фамилия)
(Last name)

Дата первоначальной выдачи Сертификата ***30.06.1999***
Original issue date

стр. 1 из 4
Page 1 of 4

© ОПЦИОН

MET REPORT HAAB 31-0730ZKT

WIND	RWY07 14008KT
	RWY25 14010KT
VIS	10KM
CLD	FEW300M
	BKN660M
	OVC2100M
LAST HOUR T/TD	16/12
QNH	1027HPA
QFE	775.4HPA
RMK	MIST=

SAET20 HAAB 310730Z

METAR 310730Z 14010KT 9999 FEW010 BKN022 OVC057 16/12 Q1027=

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FTET 31 HAAB 310420
TAF  HAAB 310330Z  3106/0112
     20010KT 9999 BKN025 BKN080
     TEMPO 3109/3115 18008KT 9000 RA SCT019 BKN025 BKN070
     BECMG 3118/3121 VRB03KT FEW024CB BKN028 BKN090
     BECMG 0103/0106 24008KT 9000 -RA/BR FEW016 SCT021 BKN030 BKN080=

TAF HADR 310330Z  3106/0112
    36006KT 9999 SCT025 SCT080
    TEMPO 3109/3115 27010KT 9000 HZ FEW018 SCT024 SCT070
    BECMG 0106/0109 VRB03KT SCT030 SCT080=

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HKZZYPYX HSSSYMYX LFZZMAFI LFZZMTXX OEJDYPYX OMDBUAEK
310406 HAABYFYX
FTET 31 HAAB 310420
TAF  HAAB 310330Z  3106/0112
     20010KT 9999 BKN025 BKN080
     TEMPO 3109/3115 18008KT 9000 RA SCT019 BKN025 BKN070
     BECMG 3118/3121 VRB03KT FEW024CB BKN028 BKN090
     BECMG 0103/0106 24008KT 9000 -RA/BR FEW016 SCT021 BKN030 BKN080=

TAF HADR 310330Z  3106/0112
    36006KT 9999 SCT025 SCT080
    TEMPO 3109/3115 27010KT 9000 HZ FEW018 SCT024 SCT070
    BECMG 0106/0109 VRB03KT SCT030 SCT080=

13.07.31 04:25:26 Automatic print Oper:SPV  Of.:HAABTEST ----------


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FTET 31 HAAB 310420
TAF  HAAB 310330Z  3106/0112
     20010KT 9999 BKN025 BKN080
     TEMPO 3109/3115 18008KT 9000 RA SCT019 BKN025 BKN070
     BECMG 3118/3121 VRB03KT FEW024CB BKN028 BKN090
     BECMG 0103/0106 24008KT 9000 -RA/BR FEW016 SCT021 BKN030 BKN080=

13.07.31 04:25:27 Automatic print Oper:SPV  Of.:HAABTEST ----------
```



En- route flight

МИНИСТЕРСТВО ТРАНСПОРТА РОССИЙСКОЙ ФЕДЕРАЦИИ
MINISTRY of TRANSPORT of RUSSIAN FEDERATION
ФЕДЕРАЛЬНОЕ АГЕНТСТВО ВОЗДУШНОГО ТРАНСПОРТА
FEDERAL AIR TRANSPORT AGENCY

РАЗРЕШЕНИЕ
на бортовые радиостанции, используемые на гражданском воздушном судне

PERMIT RADIO EQUIPMENT FOR OPERATION ON CIVIL AIRCRAFT

№ **03088**

1. Государственный и регистрационный опознавательные знаки воздушного судна Aircraft state and registration marks	2. Изготовитель, тип (наименование) воздушного судна Manufacturer, Aircraft model (name)	3. Серийный (идентификационный) номер воздушного судна Serial (identification) number
RA- 25497	Ми-8 МТВ-1	95642

4. Телеграфный позывной радиосигнал воздушного судна (при наличии)
Telegraph radio call sign of aircraft

М.П.

А.В. Девочкин
(Подпись руководителя или уполномоченного им лица, ФИО, Signature, Name)

Зам. Начальника Управления поддержания летной годности воздушных судов
Director of airworthiness department
(Должность, Title)

08.11.2012 г.
(Дата выдачи, Date of)

Перечень
бортовых радиостанций, используемых на воздушном судне
LIST OF RADIO EQUIPMENT FOR OPERATION ON CIVIL AIRCRAFT

№ n/n	Тип (наименование) бортовой радиостанции Type of Equipment (Description)	Количество, шт. pieces	Диапазон частот Frequency Band, Mhz	Сетка частот Frequency Step, Mhz	Выходная мощность Вт Power Watts
1	**Баклан-20** **BACLAN-20**	2	118,0-137,975	25 кГц	16
2	**Ядро-1А1** **YADRO-1A1**	1	2,0-11,9999 12-17,9999	100 Гц	100 50
3	**Р-855УМ** **R-855UM**	1	121,5		0,13
4	**GNS-430**	1	108,00-117,95	8,33/25 кГц	10

№ 003442

Бланк изготовлен ЗАО «ОПЦИОН» (лицензия № 05-05-09/003 ФНС РФ), уровень В, по заказу Федерального агентства воздушного транспорта. Счёт №1536 от 18.11.2011г. Тел.: (495) 726-47-42, г. Москва, 2011 г. www.opcion.ru

9. Эксплуатация радиостанции разрешается позывными сигналами:
Approved radio callsigns
Телеграфом _____ Телефоном **25497**
Telegraf _____ Telephone _____
Вес конструкции (масса) (Weight of empty aircraft (mass) **7248.0 кг**
центровка % САХ (CG position (% MAC) **(-) 61.6 мм**

Заместитель начальника ЮЖНОГО МТУ ВТ ФАВТ **А.Н. Кононыхин**
Deputy Head of Southern Interregional Territorial **A.Kononichin**
Authority of Air Transport of FATA
(Полное наименование должности - Title) (Подпись- Signature) (Фамилия - Name)
Дата выдачи **18 июля 2013 г.**
Date of issue… **July 18, 2013 y**

10. Срок действия Сертификата продлен до _____
Validity term extended till
Основание _____
On the basis of
_____
_____
(Полное наименование должности - Title) (Подпись - Signature) (Фамилия - Name)
Дата выдачи _____
Date of issue… _____

11. Срок действия Сертификата продлен до: _____
Validity term extended till
Основание: _____
On the basis of
_____
_____
(Полное наименование должности - Title) (Подпись - Signature) (Фамилия - Name)
Дата выдачи _____
Date of issue… _____

Изменения, происшедшие в процессе эксплуатации

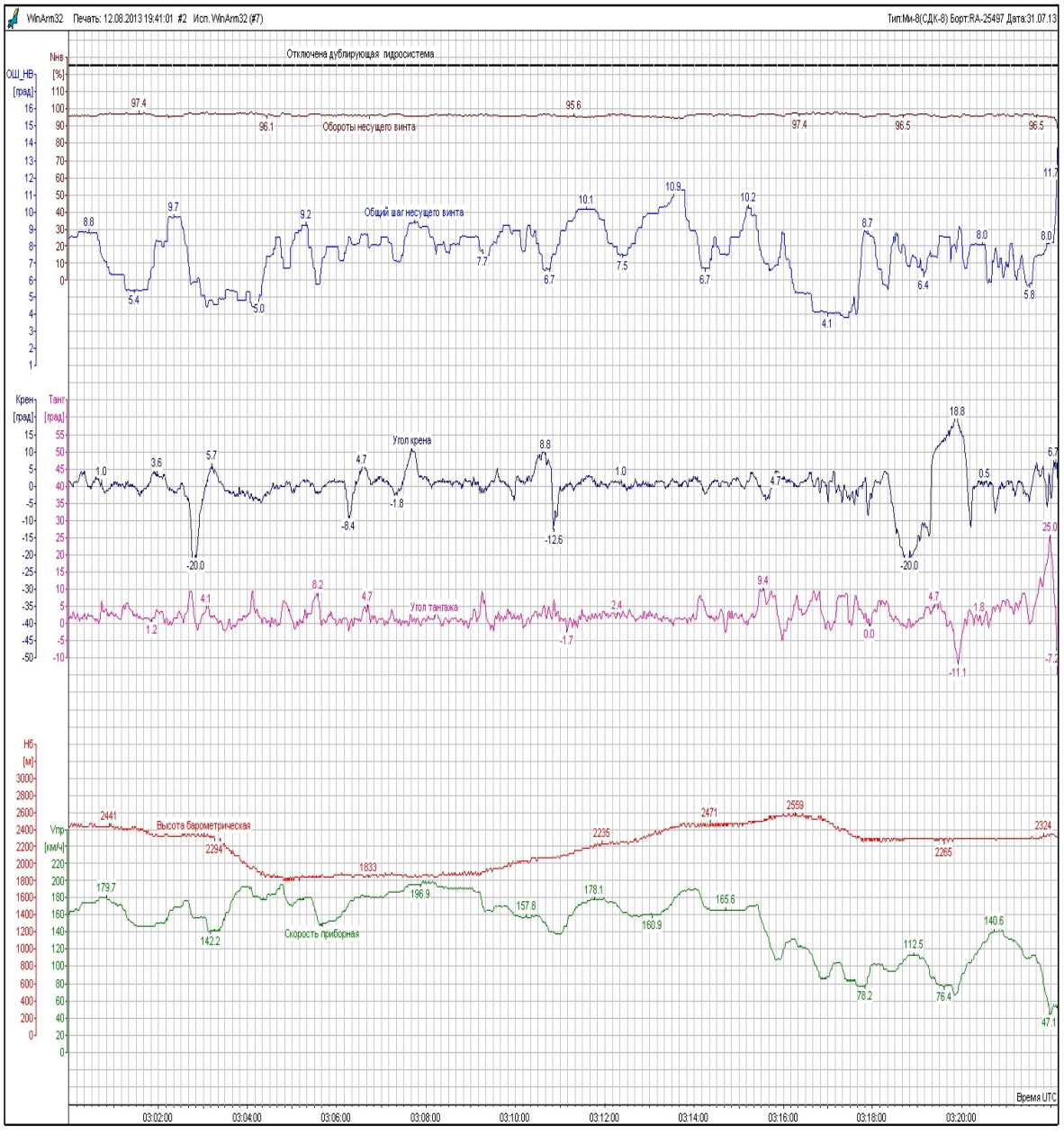


Рис.1.1 Параметры полета вертолета Ми-8 МТВ RA-25497 31.07.2013г. в р-не а/п Аддис Абеба (Эфиопия)

Fig_2 DFDR graph

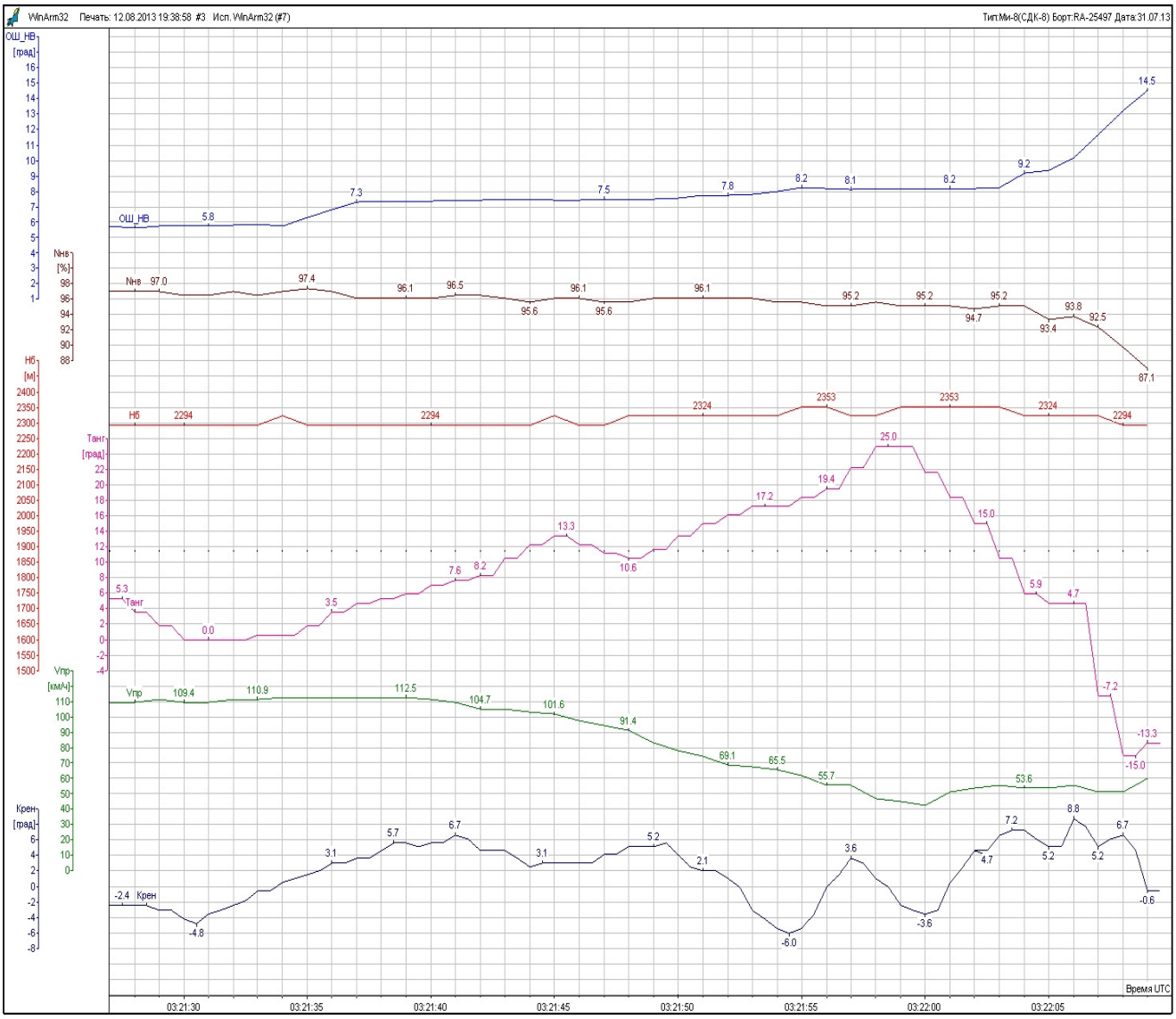


Рис.1.2 Параметры аварийного участка полета вертолета Ми-8МТВ RA-25497 от 31.07.2013

Fig_3 DFDR graph

- **Collective pitch**
- Main Rotor RPM
- Altitude
- Pitch Angle
- Air speed
- Bank Angle

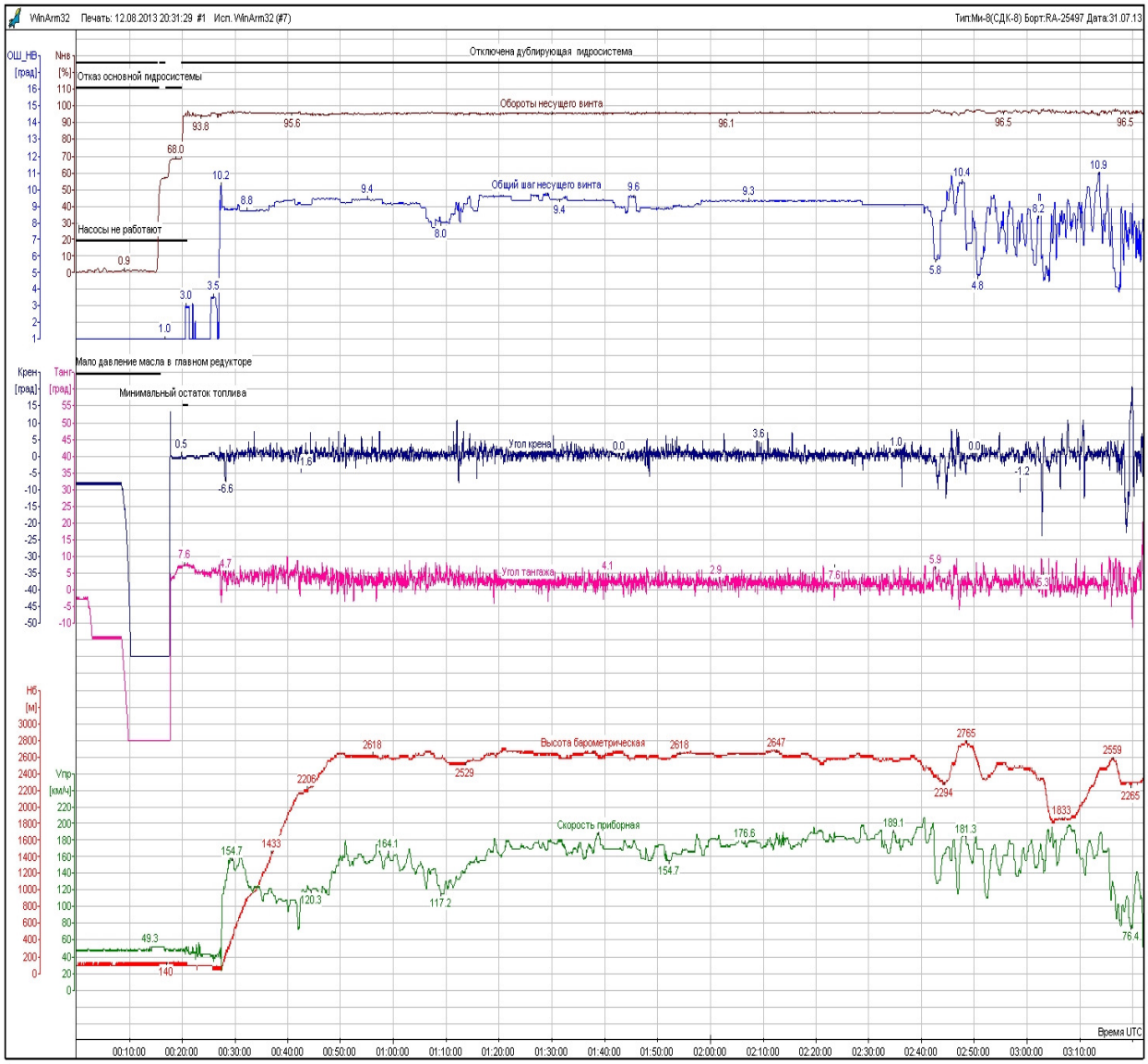


Рис.1 Параметры полета вертолета Ми-8 МТВ RA-25497 31.07.2013г. по маршруту Джибути- Аддис Абеба (Эфиопия) О Б З О Р

Fig_4 DFDR graph

ETHIOPIAN CIVIL AVIATION AUTHORITY
HELICOPTER ACCIDENT REPORT

For use by Pilot-in-Command submitting report on helicopter accident

Date and time Occurrence (UTC): July 31, 2013 07:27UTC			**Date of Report**: August 8,2013
Helicopter type: Mi-8 MTV-1	**Model:** MTV-1	**Nationality**: Russian	**Registration Mark:** RA-25497
Operator: PANH helicopters	**Owner:** PANH helicopters	**Location of accident** 35 km away from AA	**Pilot in command:** Capt. Dmitry Voloshenko
Type of operation: Ferry		**Phase of operation:** Approach for landing	
Last point of departure: Djibouti		**Point of intended landing**: Addis Ababa Bole airport **Position of helicopter** N0085943, E0390911	

Brief descriptions of Accident,

In this flight PNH 9797 I was acting as pilot-in-command. The take off from Djibouti was performed normally, the power and controls reserve was sufficient. We took off and headed to exit TMA, while climbing MSA I felt minor deviation in the autopilot operation. As we are always passing regular training of flying without autopilot there was no problem to control the helicopter in visual conditions. The flight was going normally. When we were approaching to the mountain area near to Addis Ababa we saw that the mountains become covered by the clouds. The pilot of the leading helicopter of our formation flight offered to deviate from the route to avoid high mountains and cloudy conditions. I agreed with him since he had a better experience of flying in Ethiopia and he was familiar with the area. We proceeded further and I followed him observing in front of me on the average distance of 2-3 km. The flight was normal and when we approached to ADD close as 23 Nm, the Controller gave a command to first helicopter to "hold position, make an orbit". Controller nothing told us, because I heard their conversation, I took a decision also make few orbits and hold position in order to not approach close to the first helicopter. There was a haze and light precipitation and I could not see the first helicopter permanently. I saw the ground well and decided to descend a little to provide vertical separation and avoid collusion hazard with first helicopter. I was observing the vicinity and identified a good landing spot in case the weather conditions may become worse. I made few orbits then the pilot of the first helicopter reported us that he was cleared to proceed to ADD. I recognized that I may not be able to proceed to ADD with this altitude, since I descended early to provide the vertical separation with first helicopter. When the first helicopter reported that he is proceeding to ADD, I also turned to heading ADD and start climbing FL085 which I held before. When I entered the clouds and rain, I believe that minor deviation of the autopilot may cause pitch control increase. My attention was taken to look for the position of the first helicopter among the rain and clouds and then I felt that we started climb and increase of pitch. The crew members reported me continuously that speed is decreasing. I was trying to push the control stick forward to decrease the pitch, but the helicopter was not properly reactive. When the helicopter finally changed pitch to negative and started to speed up, then I saw the ground surface approaching very close. I said to crew get prepared to hit the ground. At the final seconds I pull control stick backwards and collective pitch to the maximum. Then we hit the ground and I lost my consciousness. After that I woke up and heard that crew members called me to switch off the engines. I understood that the engines are still running and I shut down the second engine. The first engine was already shut down. Then I heard the rotor is stopping. Further we saw that the local village people came to the helicopter and started to evacuate us out of the wreckages.

Name of Pilot in command & signature. Capt. Dmitry Voloshenko

የሩሲያ ቀይ መስቀል ማኅበር
RUSSIAN RED CROSS
ደጃዝማች ባልቻ ሆስፒታል
Dejazmach Balcha Hospital

August 22, 2013

Medical Reports № 0006871

The patient **Mikhail Kalala,** aged 47, male, Case History № 2454/84794, was admitted after air accident to Dej. Balcha Hospital on 31.07.2013 at 15.35 as emergency case and received medical treatment with **diagnosis**: Multitrauma: compressive fracture of Th12 of III degree; comminuted fracture of the shaft of the right femoral bone; longitudinal fracture of the distal part of the radial bone of the right forearm. Contusion of the chest. Contused wounds of the face; open fracture of the frontal bone of the left side. Contused wounds of the scalp of the occipital region of the head. Traumatic shock of II-III degree. **Considered as seriously injured. Recommended to get further treatment at the place of residence.**

The patient **Dmitry Voloshenko,** aged 47, male, Case History № 2453/ 84797, was admitted after air accident to Dej. Balcha Hospital on 31.07.2013 at 15.35 as emergency case and received medical treatment with **diagnosis**: Closed fracture of the shaft of the right femoral bone with displacement. Closed fracture of the neck of talus of the right side. Closed fracture of the neck of talus of the left side. Closed fracture of the base of the V right metatarsal bone. Closed fracture of the medial malleolus of the left side with displacement. Lacerated wound of the left forearm. Closed fracture of the II-V-VIII ribs of the right side, of I-II-VI of left-side. Right-side hemothorax. Traumatic shock of II-III degree. **Considered as seriously injured. Recommended to get further treatment at the place of residence.**

The patient **Igor Veremeenko,** aged 51, male, Case History № 2451/ 84796, was admitted after air accident to Dej. Balcha Hospital on 31.07.2013 at 15.35 as emergency case and received medical treatment with **diagnosis**: Contusion of the chest. Contusion of the vertebral column. Traumatic shock of I degree. Marked extended osteochondrosis of the vertebral column. **Considered as minor injured. Recommended to get further treatment at the place of residence.**

The patient **Konstantin Matveev,** aged 45, male, Case History № 2452/ 84798, was admitted after air accident to Dej. Balcha Hospital on 31.07.2013 at 15.35 as emergency case and received medical treatment with **diagnosis**: Multitrauma: compressive fracture of L1 with the contusion of the spinal marrow. Closed craniocerebral trauma. Contused lacerated wound of the scalp of the head. Two- malleolar fracture of the left shin without displacement. Contusion of the left knee joint. Dislocation of proximal phalanx of I finger of the left hand. Traumatic shock of III degree. **Considered as seriously injured. Recommended to get further treatment at the place of residence.**

DEJAZMACH BALCHA HOSPITAL ADDIS ABABA ETHIOPIA

Director General — Alexander V. Bruev
Medical Director — Natalia M.Shevyakova

The RRC Dej. Balcha Memorial Hospital
Lideta Kifle Ketema, Kebele 07, H.70
Tel. office : 011- 551 52 05, reception 011- 551 40 72
Fax 011- 551 62 63

Tin No 0001505844
P. O. Box 94
Addis Ababa
Ethiopia

THE TRANSCRIPT of the CVR P-503B of the helicopter Mi-8 MTV RA-25497that had the accident on July 31 2013in the area of Addis-Ababa airport of the Republic of Ethiopia

Time (beginning)	Time (end)	Speaker	Content (English language)	Content (original language)	Note
06:44:38,5	06:44:39,0	PIC	Do descend	Снижайся.	
06:44:47,5	06:44:50,6	F/O	Captain, what for to descend, straight ahead there will be mountains.	Командир, а зачем снижаться, прямо по курсу горы будут.	
06:44:54,9	06:44:56,3		*(illeg)*	*(нрзб).*	
06:44:57,5	06:44:59,5		*Radio communication of another aircraft.*	*Переговоры другого борта.*	
06:45:03,1	06:45:05,0		*(illeg)* how do you read.	*(illeg)* how do you read.	
06:45:10,2	06:45:33,4		*Radio communication of another aircraft.*	*Переговоры другого борта.*	
06:45:32,3	06:45:33,6	Crew	RPM*(illeg.)*	Обороты *(нрзб).*	
06:45:47,4	06:45:48,6	PIC	To heading 210..	На курс 210.	
06:45:51,3	06:45:54,3	PIC	The same. I propose to to go all these mountains round.	Аналогично. Я предлагаю обойти все эти горы.	
06:45:58,9	06:46:00,3	PIC	The heading 210 I said	Курс 210 сказал.	
06:46:17,3	06:46:20,2	PIC	This one (illeg.) ahead do you see. Take even to the left of it.	Вот эту *(нрзб)* впереди видишь? Бери левее её даже.	
06:46:25,1	06:46:26,7	F/O	*(illeg.)* I see.	*(нрзб)* я вижу.	
06:46:49,9	06:46:52,2	F/O	Distance 71 miles, yes.	Удаление 71 миля, да.	
06:46:55,4	06:47:00,2	PIC	So what, will we report the distance 70 miles and waiting weather from the south?	Ну что, будем докладывать удаление 70 миль и waiting weather from the south?	
06:47:03,2	06:47:03,7	Crew	(Huh, Yura)?	(А, Юра)?	
06:47:08,7	06:47:08,9	PIC	Yura.	Юра.	
06:47:09,5	06:47:10,0	25114	Yes-yes	Да-да.	
06:47:20,0	06:47:20,5	PIC	Yura	Юра.	
06:47:20,7	06:47:23,8	25114	*(illeg)* one- four, good morning.	*(illeg)* one- four, good morning.	
06:47:32,1	06:47:33,6	ATC	*(illeg)* call sign.	*(illeg)* call sign.	

06:47:34,4	06:47:47,4	PIC	Papa November Hotel 9-7-1-4 good morning from Djibouti to *(illeg)* 7-0 nautical miles inbound on radial 0-6-0.	Papa November Hotel 9-7-1-4 good morning from Djibouti to *(illeg)* 7-0 nautical miles inbound on radial 0-6-0.	
06:47:48,5	06:47:55,4	ATC	OK, Addis Ab.. at 0-7-2-5.	OK, Addis Ab.. at 0-7-2-5.	
06:47:55,4	06:47:58,7	ATC	Arsole change 1-2-5 decimal 1, 8-5.	Arsole change 1-2-5 decimal 1, 8-5.	
06:47:59,5	06:48:00,0	F/O	(Are we leaving)?	(Уходим)?	
06:48:05,3	06:48:06,0	F/O	Do you see them?	Ты видишь их?	
06:48:08,1	06:48:09,5	A	Repeat your frequency, please.	Repeat your frequency, please.	
06:48:09,5	06:48:11,1	A	One (niner) *(illeg)*.	One (niner) *(illeg)*.	
06:48:17,9	06:48:19,1	F/O	It's he who has completed.	Это он отработал.	
06:48:20,5	06:48:22,2	PIC	I have just asked, do you have eighty-fifth?	Сейчас спросил, восемьдесят пятый у вас?	
06:48:23,1	06:48:25,3	F/O	Captain, ask Yura, what's he there?	Командир, вы спросите у Юры, что он там это?	
06:48:27,0	06:48:31,8	ATC	*(illeg)* Addis copied expect runway 2-5 left.	*(illeg)* Addis copied expect runway 2-5 left.	
06:48:31,8	06:48:51,1	ATC	0-6-3-0 Met report: wind 1-0 degrees, 0-6 knots, visibility 1-0 kilometers, cloud broken 6-6-0 meters, broken 2-4-0-(0) meters, temperature 1-7, QNH 1-0-2-7 hectopascal, 1-0-2-7 hectopascal report *(illeg)* 1-2-5 decimal 5.	0-6-3-0 Met report: wind 1-0 degrees, 0-6 knots, visibility 1-0 kilometers, cloud broken 6-6-0 meters, broken 2-4-0-(0) meters, temperature 1-7, QNH 1-0-2-7 hectopascal, 1-0-2-7 hectopascal report *(illeg)* 1-2-5 decimal 5.	
06:48:58,3	06:48:58,7	PIC	Can you see them?	Видишь их?	
06:49:01,3	06:49:07,4	PIC	Addis Papa Nove Hotel 9-7-9-7 position seven-zero miles inbound.	Addis Papa Nove Hotel 9-7-9-7 position seven-zero miles inbound.	
06:49:08,7	06:49:10,3	ATC	Addis 9-7-9-7.	Addis 9-7-9-7.	
06:49:10,6	06:49:14,2	PIC	Position 7-0 miles inbound report (inside).	Position 7-0 miles inbound report (inside).	
06:49:15,5	06:49:18,7	ATC	Seven-zero miles inbound to Arsole confirm?	Seven-zero miles inbound to Arsole confirm?	
06:49:21,7	06:49:22,1	ATC	Addis.	Addis.	
06:49:22,3	06:49:24,1	F/O	He is asking: "Confirm"	Он спрашивает: "Подтверждаете".	
06:49:24,7	06:49:26,2		One- ze..seven *(illeg)*.	One- ze..seven *(illeg)*.	
06:49:25,6	06:49:28,0	ATC	Papa November Hotel 9-7-9-7 Addis.	Papa November Hotel 9-7-9-7 Addis.	

06:49:29,0	06:49:31,1	PIC	9-7-9-7 go ahead.	9-7-9-7 go ahead.	
06:49:31,5	06:49:33,0	Crew	We have 70 miles from whom?	У нас 70 миль от кого?	
06:49:33,0	06:49:38,1	ATC	(Complete/again please) your distance is it from Alfa Delta Sierra or Alfa Bravo?	(Complete/again please) your distance is it from Alfa Delta Sierra or Alfa Bravo?	
06:49:38,5	06:49:39,9	PIC	(At/He) ours from what is this?	(У/он) нас от чего этот?	
06:49:41,5	06:49:41,9	Crew	(Ask)	(Спроси).	
06:49:41,9	06:49:42,9	F/O	From Addis-Ababa	От Addis-Ababa.	
06:49:43,7	06:49:44,4	PIC	Do you see them?	Ты их видишь?	
06:49:47,1	06:49:47,7	PIC	You see them, don't you?	Видишь, да?	
06:49:47,9	06:49:48,8	F/O	No, captain	Нет, командир.	
06:49:48,1	06:49:48,8	F/M	I do not see them.	Я их не вижу.	
06:49:49,4	06:49:50,0	F/O	Cannot see	Не вижу.	
06:49:50,0	06:49:52,8	25114	Addis, Papa, November Hotel 9-7-1-4.	Addis, Papa, November Hotel 9-7-1-4.	
06:49:53,3	06:49:53,6	PIC	I see.	Вижу.	
06:49:54,3	06:49:55,5	ATC	9-7-1-4 Addis.	9-7-1-4 Addis.	
06:49:55,5	06:49:56,3	PIC	Ah, OK, see.	А, всё, вижу.	
06:49:56,5	06:49:59,3	25114	Report Arsole, level zero (five/seven).	Report Arsole, level zero (five/seven).	
06:49:58,4	06:49:59,0	ATC	Confirm.	Confirm.	
06:50:00,8	06:50:01,7	F/O	Therea captain, (began)	Вон, командир, (начал).	
06:50:01,4	06:50:02,5	ATC	Arsole now confirm.	Arsole now confirm.	
06:50:03,3	06:50:03,7	PIC	Confirm.	Confirm.	
06:50:07,3	06:50:08,5	PIC	Arsole approaching, aren't we?	Arsole заходим, да?	
06:50:08,4	06:50:10,6	ATC	*(illeg)* 7-9-7 Addis request your position.	*(illeg)* 7-9-7 Addis request your position.	
06:50:13,9	06:50:24,3	PIC	Papa November Hotel 9-7-9-7 proceeding behind 9-7-1-4 we proceeding (his) company, traffic inside proceeding behind.	Papa November Hotel 9-7-9-7 proceeding behind 9-7-1-4 we proceeding (his) company, traffic inside proceeding behind.	
06:50:26,7	06:50:39,2	ATC	Copied-copied, you are behind maintain on (separation) report passing 8-0 nautical miles to Golf Whisky Zulu on one-two-five decimal one.	Copied-copied, you are behind maintain on (separation) report passing 8-0 nautical miles to Golf Whisky Zulu on one-two-five decimal one.	
06:50:40,1	06:50:45,9	PIC	A.. Eight-zero miles at one-two-five decimal one, confirm.	A.. Eight-zero miles at one-two-five decimal one, confirm.	

06:50:47,2	06:50:51,6	ATC	That is correct Papa November Hotel 9-7-1-4 coppied.	That is correct Papa November Hotel 9-7-1-4 copied.	
06:50:55,2	06:51:00,8	F/O	*(illeg)* will report eight-zero miles on one..	*(illeg)* will report eight-zero miles on one..	
06:51:02,6	06:51:05,1	F/O	One-two-one decimal one	One-two-one decimal one	
06:51:08,2	06:51:10,4	F/O	One-two-one decimal one did he say?	One-two-one decimal one онсказал?	
06:51:11,9	06:51:12,5	PIC	Maybe	Наверно.	
06:51:13,7	06:51:15,1	F/O	10 miles told to report.	10 миль сказал доложить.	
06:51:15,6	06:51:16,9	PIC	Eight-zero, eighty.	Eight-zero, восемьдесят.	
06:51:21,6	06:51:23,6	PIC	(Seryoga), and we already at what pressure do set?	(Серёга), а мы уже на какое давление ставим?	
06:51:25,0	06:51:25,3	Crew	What?	А?	
06:51:26,0	06:51:26,6	Crew	We have now..	У нас сейчас..	
06:51:26,2	06:51:27,3	Crew	Once more, did not get.	Ещё раз, не понял.	
06:51:28,3	06:51:29,8	PIC	What position do we have now?	Какое место у нас сейчас?	
06:51:31,3	06:51:32,0	F/O	To what?	До чего?	
06:51:32,6	06:51:33,5	Crew	(Seven hundred) heavy.	(Семьсот) большой.	
06:51:33,5	06:51:34,2	PIC	(To) Addis-Ababa	(До) Addis-Ababa.	
06:51:35,9	06:51:41,0	PIC	Yura, so for now we should report 66 miles to Addis-Ababa, we… and we what are we reporting?	Юра, так нам надо доложить 66 миль до Addis-Ababa уже, мы.. а мы чего докладываем?	
06:51:45,9	06:51:46,7	PIC	Yura, do you hear?	Юра, слышишь?	
06:51:47,3	06:51:49,3	25114	Sure yes I hear, repeat once more.	Да-да-да, слышу, повтори ещё раз.	
06:51:49,6	06:51:55,0	PIC	(Should you repeat say:)correct positions 6-0 miles inbound Addis-Ababa.	(Тыеслиповторишь,скажи:) correct positions 6-0 miles inbound Addis-Ababa.	
06:51:56,0	06:51:58,3	PIC	He said 80 miles to report or what?	Он сказал 80 миль доложить или что?	
06:52:00,6	06:52:03,9	25114	To outbound *(illeg.)* we were reported long time ago, (illeg.) reported.	До выхода *(нрзб)* нам уже давно доложили, *(нрзб)* доложили.	
06:52:04,4	06:52:12,1	PIC	Now he needs the precise position, and you have missed the frequency, what is it one two five decimal one?	Вот ему сейчас надо точное место, а ты частоту прослушал, какую сто двадцать пять запятая один?	
06:52:13,1	06:52:15,1	25114	Correct one two five decimal one.	Точно так, 125 запятая 1.	
06:52:15,2	06:52:16,2	PIC	And from what distance?	А с какого удаления?	

06:52:18,0	06:52:20,7	25114	Here I have missed the distance, it seemed to me 6-0	Вот я прослушал удаление, мне показалось 6-0.	
06:52:24,2	06:52:25,0	25114	Will report 6-0.	Доложим 6-0.	
06:52:25,9	06:52:28,2	PIC	Good, will report 6-0 Addis-Ababa.	Хорошо, доложим 6-0 Addis Ababa.	
06:52:33,1	06:52:34,1	F/O	Sixty five miles.	Шестьдесят пять миль.	
06:52:38,7	06:52:39,6	PIC	Sixty-five at the moment?	Шестьдесят пять сейчас?	
06:52:39,8	06:52:41,3	F/O	Sixty five.	Шестьдесят пять.	
06:52:41,6	06:52:42,1	PIC	OK.	Хорошо.	
06:52:57,2	06:52:58,5	F/O	On what frequency he said.	На какой частоте он сказал.	
06:52:58,8	06:52:59,3	F/O	One two zero	Сто двадцать...	
06:53:00,6	06:53:01,1	F/O	One	Один.	
06:53:01,7	06:53:02,7	PIC	One two five and one	Сто двадцать пять и один.	
06:53:23,8	06:53:26,5	F/O	In the GPS data base there are no such frequencies at all.	В сборнике в GPSке таких вообще частот нету.	
06:53:27,3	06:53:27,6	Crew	*(illeg.)*	*(нрзб).*	
06:53:28,1	06:53:29,0	PIC	Write (for you).	Запиши (себе).	
06:53:31,7	06:53:36,5	PIC	Yur, once more, something is today. At 60 miles we will contact one two five decimal one, won't we?	Юр, ещё раз, что-то сегодня. На 60 миль на 125 запятая 1 переходим, да?	
06:53:37,4	06:53:41,8	25114	Correct: 60 miles, one two five decimal one	Точно так: 60 миль, 125 запятая 1.	
06:53:45,9	06:53:46,7	PIC	The same	Тоже самое.	
06:54:19,2	06:54:21,2	PIC	We have come you up, already close.	Мы вас догнали, близко уже.	
06:54:24,8	06:54:26,3	25114	Fly at your convenience.	Вы летите как вам удобнее.	
06:54:28,3	06:54:29,9	F/O	Captain, sixty (two) distance	Командир, шестьдесят (две) удаление.	
06:54:32,2	06:54:33,1	PIC	So what, shall we report?	Ну что, докладываем?	
06:54:37,7	06:54:40,6	25114	Addis, Papa November Hotel (niner)	Addis, Papa November Hotel (niner)	
06:54:41,3	06:54:42,8	25114	9-7-1-4.	9-7-1-4.	
06:54:44,5	06:54:48,0	25114	Distance 6-0 miles inbound.	Distance 6-0 miles inbound.	
06:54:54,9	06:54:57,9	25114	Addis, Papa November Hotel 9-7-1-4.	Addis, Papa November Hotel 9-7-1-4.	
06:55:01,0	06:55:05,1	PIC	Addis, Papa November Hotel number 9-7-9-7.	Addis, Papa November Hotel number 9-7-9-7.	
06:55:10,3	06:55:12,0	PIC	Well let's report on the other frequency.	Ну давай, на другой частоте доложим.	

06:55:17,5	06:55:19,5	F/O	Approach one one nine and seven.	Approach 119 и 7.	
06:55:19,6	06:55:22,9	PIC	Addis, Papa November Hotel 9-7-9-7.	Addis, Papa November Hotel 9-7-9-7.	
06:55:31,9	06:55:34,4	25114	Addis, Papa November Hotel 9-7-1-4.	Addis, Papa November Hotel 9-7-1-4.	
06:55:47,3	06:55:48,1	PIC	Now where are they?	Сейчас где они?	
06:55:49,1	06:55:49,7	F/O	Where (illeg.)	Куда *(нрзб)*.	
06:55:49,4	06:55:50,0	Crew	*(illeg)* (at left)	*(нрзб)* (слева).	
06:55:50,5	06:55:51,9	Crew	OK *(illeg.)* I see.	Нормально *(нрзб)* вижу.	
06:55:52,4	06:55:53,7	Crew	How much is there by the route?	Сколько там по маршруту?	
06:55:55,0	06:55:56,4	F/O	We are diverting southwards	Мы уклоняемся южнее.	
06:55:56,9	06:55:58,3	PIC	I know, we are just flying the mountains round.	Я знаю, мы же горы обходим.	
06:55:59,9	06:56:02,1	F/O	More than 10 miles we have diverted	10 миль слишним отклонились.	
06:56:18,9	06:56:22,0	PIC	Addis, Papa November Hotel 9-7-9-7.	Addis, Papa November Hotel 9-7-9-7.	
06:56:41,3	06:56:42,1	F/O	(Altitude) *(illeg.)*	(Высота) *(нрзб)*.	
06:56:57,8	06:56:59,2	PIC	Have you gone downwards, Yura	(Ты что вниз пошёл,Юра)?	
06:57:02,5	06:57:03,0	PIC	Yura	Юра.	
06:57:09,3	06:57:10,8	F/O	Just below us, captain. In sight?	Чуть ниже нас, командир. Наблюдаешь?	
06:57:10,9	06:57:11,4	PIC	Yes-yes	Да-да.	
06:57:12,8	06:57:13,5	PIC	At the moment yes	Теперь да.	
06:57:19,5	06:57:23,3	PIC	Addis, Papa November Hotel 9-7-9-7.	Addis, Papa November Hotel 9-7-9-7.	
06:57:25,3	06:57:29,1	ATC	Papa November Hotel 9-7-9-7 Addis if you read?	Papa November Hotel 9-7-9-7 Addis if you read?	
06:57:30,0	06:57:40,3	PIC	Now we read you five. We are 2 helicopter have pass position 6-0 miles inbound Addis-Ababa.	Now we read you five. We are 2 helicopter have pass position 6-0 miles inbound Addis-Ababa.	
06:57:42,0	06:57:45,7	PIC	I waiting weather proceed *(illeg)*5 miles. {PIC}	I waiting weather proceed *(illeg)*5 miles. {PIC}	
06:58:02,3	06:58:05,1	ATC	Addis, Papa November Hotel 9-7-9-7, how do you read me?	Addis, Papa November Hotel 9-7-9-7, how do you read me?	
06:58:20,8	06:58:21,6	PIC	Does not answer	Не отвечает.	
06:58:22,4	06:58:23,0	Crew	Does he answer?	Отвечает?	
06:58:26,1	06:58:28,8	PIC	Addis, Papa November Hotel 9-7-9-7.	Addis, Papa November Hotel 9-7-9-7.	

06:58:35,0	06:58:38,4	25114	Addis-Tower, Papa November Hotel 9-7-1-4.	Addis-Tower, Papa November Hotel 9-7-1-4.	
06:58:58,3	06:59:00,9	25114	Addis, Papa November Hotel 9-7-1-4.	Addis, Papa November Hotel 9-7-1-4.	
06:59:12,3	06:59:16,7	PIC	(We) are slightly descending the altitude the same *(illeg.)*	(Мы) снижаемся чуть-чуть высоту одинаковую *(нрзб)*.	
06:59:34,0	06:59:36,7	PIC	Addis, Papa November Hotel 9-7-9-7.	Addis, Papa November Hotel 9-7-9-7.	
06:59:36,7	06:59:39,0	ATC	7-(1-4) *(illeg)*.	7-(1-4) *(illeg)*.	
06:59:42,1	06:59:45,8	25114	Addis-Addis, Papa November Hotel 9-7-1-4.	Addis-Addis, Papa November Hotel 9-7-1-4.	
06:59:46,9	06:59:48,3	Crew	*(illeg.)* frequency *(illeg.)*	*(нрзб)* частота *(нрзб)*.	
06:59:49,7	06:59:51,3	PIC	Indeed somebody contacted on it.	Да кто-то выходил на ней.	
06:59:58,4	07:00:08,7	PIC	Here it is hardly seen from behind this pretty mountain now we will be passing it forward kilometers more, how much do we have here, twenty…twenty five.	Тут из-за горушки видно плохо сейчас пройдём её вперёд ещё километров, а сколько тут получается, двадцать... двадцать пять.	
07:00:11,1	07:00:14,8		*Radio communication of another aircraft*	*Переговоры другого борта.*	
07:00:14,7	07:00:16,5	F/O	If we will go like this, do you see?	Если будем так и идти, видите?	
07:00:16,6	07:00:17,0	PIC	Huh?	А?	
07:00:17,2	07:00:19,8	F/O	Yes, here do you see (illeg.) illuminated, red	Да, вон видите *(нрзб)* загорел, красное.	
07:00:20,2	07:00:21,9	PIC	Yes I see, but what to do…	Да я вижу, ну а что делать..	
07:00:23,7	07:00:26,9		*Radio communication of another aircraft*	*Переговоры другого борта.*	
07:00:29,0	07:00:30,0			(8-7-0).	
07:00:32,0	07:00:34,1	F/O	It is no good that we drag to the left…	Нам влево не желательно увлекать..	
07:00:34,4	07:00:37,0	PIC	So, we have the mountain on the right, here I watch by the radar.	Ну, у нас справа гора, вот я по локатору смотрю.	
07:00:37,4	07:00:45,8	PIC	This way like as we are going now, we will cover 12 miles more and it will be possible to turn in to the right bit by bit.	Вот так вот если как мы сейчас идём пройдём ещё 12 миль и можно будет по-тихонечку вправа доворачивать.	
07:00:52,0	07:00:54,0		*Radio communication of another aircraft*	*Переговоры другого борта.*	
07:00:56,1	07:01:09,6		*Radio communication of another aircraft*	*Переговоры другого борта.*	
07:01:13,1	07:01:14,4		*Radio communication of another aircraft*	*Переговоры другого борта.*	
07:01:19,5	07:01:22,2		*Radio communication of another aircraft*	*Переговоры другого борта.*	
07:02:13,2	07:02:13,5	Crew	*(illeg.)*	*(нрзб)*.	

07:02:26,1	07:02:28,0		*(illeg).*	*(illeg).*	
07:02:28,0	07:02:29,6	PIC	Wut, GPS device does not want to work, does it?	Чё, GPSка не хочет работать?	
07:02:32,1	07:02:32,8	PIC	GPS device.	GPSка.	
07:02:33,0	07:02:33,6	F/O	Naw.	Неа.	
07:02:36,3	07:02:37,4	F/O	It seems that it misbehaves.	Что-то она глючит.	
07:03:18,0	07:03:18,8	PIC	In sight.	Наблюдаю.	
07:04:03,4	07:04:06,8	25114	Addis-Addis, Papa November Hotel 9-7-1-4.	Addis-Addis, Papa November Hotel 9-7-1-4.	
07:04:15,4	07:04:18,0	25114	Addis, Papa November Hotel 9-7-1-4.	Addis, Papa November Hotel 9-7-1-4.	
07:04:20,5	07:04:24,4	PIC	*(illeg)* one. {D}	*(illeg)* one. {Д}	
07:04:29,4	07:04:32,8	PIC	Addis Papa November Hotel 9-7-9-7.	Addis Papa November Hotel 9-7-9-7.	
07:04:33,0	07:04:48,6	25114	Papa November Hotel 9-7-1-4 distance 0-5-5, level 0-8-5 ETA Addis at 0-7-2-5.	Papa November Hotel 9-7-1-4 distance 0-5-5, level 0-8-5 ETA Addis at 0-7-2-5.	
07:04:53,5	07:04:59,5	ATC	Papa November Hotel 9-7-9-7 (contact tower) 1-1-8 decimal 1.	Papa November Hotel 9-7-9-7 (contact tower) 1-1-8 decimal 1.	
07:05:03,9	07:05:09,5	25114	Papa November Hotel 9-7-1-4.contact tower 1-1-8 decimal 4.	Papa November Hotel 9-7-1-4.contact tower 1-1-8 decimal 4.	
07:05:09,5	07:05:12,3	ATC	1-1-8 decimal 1.	1-1-8 decimal 1.	
07:05:12,3	07:05:16,6	25114	1-1-8 decimal 1, Papa November Hotel 9-7-1-4.	1-1-8 decimal 1, Papa November Hotel 9-7-1-4.	
07:05:20,6	07:05:21,6	PIC	118 and 1	118 и 1.	
07:05:23,7	07:05:25,1	F/O	120… what did he say?	120.. что он сказал?	
07:05:25,5	07:05:26,8	PIC	1-1-8 decimal 1.	1-1-8 decimal 1.	
07:05:28,0	07:05:31,8	25114	Bole-Tower, Papa November Hotel 9-7-1-4.	Bole-Tower, Papa November Hotel 9-7-1-4.	
07:05:36,0	07:05:37,7	F/O	Captain, to the le… to the left it is going.	Командир, леве.. левее уходит.	
07:05:45,3	07:05:46,1		Yes, (illeg)	Да, *(нрзб).*	
07:05:46,2	07:05:50,5	25114	Bole-Tower, Bole-Tower, Papa November Hotel 9-7-1-4.	Bole-Tower, Bole-Tower, Papa November Hotel 9-7-1-4.	
07:06:02,1	07:06:05,6	PIC	Addis Tower, Papa November Hotel 9-7-9-7.	Addis Tower, Papa November Hotel 9-7-9-7.	

07:06:07,2	07:06:10,9	25114	Bole-Tower, Bole-Tower, Papa November Hotel 9-7-1-4.	Bole-Tower, Bole-Tower, Papa November Hotel 9-7-1-4.	
07:06:25,9	07:06:26,8	25114	Do you have me in sight?	А ты меня наблюдаешь?	
07:06:28,7	07:06:35,1	PIC	Yes-yes, (illeg.) behind I am going on seven.	Да-да, я сзади, *(нрзб)* сзади иду на семь *(нрзб)*.	
07:06:43,7	07:06:45,8	F/O	We have fuel flow about 800 litres , captain, per hour.	У нас расход где-то 800 литров, командир, в час.	
07:06:48,5	07:06:49,1	F/O	Maybe just…	Может быть хоть...	
07:06:49,1	07:06:49,7		*(illeg.)*	*(нрзб)*.	
07:06:50,9	07:06:51,5		*(illeg.)*	*(нрзб)*.	
07:06:52,9	07:06:53,8		*(illeg.)*	*(нрзб)*.	
07:06:56,1	07:06:56,7	PIC	Enter	Введи.	
07:08:30,2	07:08:31,4	PIC	(What are they driving off the speed)?	(Чтоонискоростьсгоняют)?	
07:08:36,9	07:08:39,8	PIC	Tower Papa Nove Hotel 9-7-9-7.	Tower Papa Nove Hotel 9-7-9-7.	
07:08:43,2	07:08:44,8	PIC	And what was it? 120	Абылакакая? 120..	
07:08:44,8	07:08:45,7	A	*(illeg.)*	*(нрзб)*.	
07:08:51,0	07:08:53,0	PIC	This is Tower, isn't it? (illeg.)	Это же Tower, да? *(нрзб)*.	
07:08:53,8	07:08:55,0	25114	This is Bole-Tower	Это Bole-Tower.	
07:08:59,3	07:08:59,8	PIC	What is it?	Это что?	
07:09:00,5	07:09:02,5	25114	(Approach)	(Подход) Addis Ababa Tower.	
07:09:03,4	07:09:03,8	Crew	*(illeg.)*	*(нрзб)*.	
07:09:15,9	07:09:17,0	PIC	Wut's there, prohibited areas.	Чё там, запретные зоны.	
07:09:27,5	07:09:34,8	***GPWS***	***"ATTENTION, TERRAIN AHEAD".***	***"ВНИМАНИЕ, ВПЕРЕДИ ЗЕМЛЯ".***	***4 cycles***
07:09:36,4	07:09:37,0	PIC	Switch it off.	Отключи.	
07:09:47,2	07:09:48,3	F/O	Czptain, before shutd…	Командир, перед выклю..	
07:09:49,4	07:09:49,8	PIC	What?	Что?	
07:09:50,4	07:09:54,8	F/O	Before shutdown to report "We are need refuelling", maybe, for them to provide.	Перед выключением запросить "Weareneedrefuelling", наверное, чтоб они подогнали.	
07:09:54,8	07:09:58,3	PIC	Will you wait you, let's complete the flight, land, why do you go two steps forward?	Подожди ты, давай долетим, сядем, что ты на 2 шага вперёд идёшь?	
07:10:50,7	07:10:52,5	***GPWS***	***"TERRAIN-TERRAIN" (F= 400-800 Hz).***	***"ЗЕМЛЯ-ЗЕМЛЯ" (F= 400-800Гц).***	

07:11:04,1	07:11:05,7	F/O	Such an interesting landscape is here, isn't it?	Какой ланшафт здесь интересный, да?	
07:11:08,1	07:11:09,0	F/O	Such tablelands, yes?	Какие плато, да?	
07:11:17,7	07:11:20,7	25114	Bole-Tower Papa November Hotel, 9-7-1-4.	Bole-Tower Papa November Hotel, 9-7-1-4.	
07:11:26,9	07:11:30,6	PIC	Bole-Tower Papa November Hotel 9-7-9-7, Bole-Tower.	Bole-Tower Papa November Hotel 9-7-9-7, Bole-Tower.	
07:11:35,7	07:11:37,5	PIC	Bole-Tower Papa November Hotel...	Bole-Tower Papa November Hotel...	
07:11:41,4	07:11:42,0	F/M	Is keeping silence.	Молчит.	
07:12:37,6	07:12:40,4	F/O	And normally we have the mountain ahead.	А по идее впреди гора что-ли получается (у нас).	
07:12:43,8	07:12:45,2	F/O	And here in front of the mountain there is an airfield, isn't it?	А вот здесь перед горой аэродром, да?	
07:12:48,1	07:12:49,2	F/O	Huh, oh quite…	А, о как..	
07:12:55,1	07:12:56,3	PIC	What is your GPS displaying?	Что у тебя GPS показывает...?	
07:12:57,8	07:12:58,5	PIC	By the terrain?	По рельефу?	
07:13:20,3	07:13:21,1		*(illeg.)*	*(нрзб)*.	
07:13:21,1	07:13:22,7	F/O	Ahead on the heading, there, it is hardly to be seen.	Впереди по курсу, вон, еле-еле видать.	
07:13:22,7	07:13:23,4	PIC	(Going round) on the right	(Обходим) справа.	
07:13:24,3	07:13:24,9	F/O	(That's all), has disappeared.	(Всё), пропал.	
07:13:25,7	07:13:26,2	F/O	And, here it is	А, вот он.	
07:13:28,8	07:13:31,6	F/O	Look here it is, captain, drawing on by your side can you see?	Вот-вот-вот, командир, догоняет с Вашей стороны видите?	
07:13:49,2	07:13:50,0	PIC	And now *(illeg.)*?	А сейчас *(нрзб)*?	
07:14:20,9	07:14:23,8	25114	Bole-Tower, Papa November Hotel 9-7-1-4.	Bole-Tower, Papa November Hotel 9-7-1-4.	
07:14:28,5	07:14:45,3	25114	Papa November Hotel 9-7-1-4, approaching from East... 3-0 miles inbound (expect) landing in 2-5 minutes.	Papa November Hotel 9-7-1-4, approaching from East... 3-0 miles inbound (expect) landing in 2-5 minutes.	
07:14:49,1	07:14:51,1	PIC	Radial 0-9-0.	Radial 0-9-0.	
07:14:54,8	07:15:10,1	ATC	Papa November Hotel 9-7-9-7-1-4, roger (continue approach) and maintain radial 0-9-0, report 2-0 miles, Alfa Delta (Sierra).	Papa November Hotel 9-7-9-7-1-4, roger (continue approach) and maintain radial 0-9-0, report 2-0 miles, Alfa Delta (Sierra).	

07:15:10,5	07:15:16,1	25114	Report 2-0 miles, radial 0-9-0.	Report 2-0 miles, radial 0-9-0.	
07:15:16,8	07:15:19,2	ATC	*(illeg)* QNH 1-0-2-7.	*(illeg)* QNH 1-0-2-7.	
07:15:20,3	07:15:22,6	25114	QNH one zero two seven establish.	QNH one zero two seven establish.	
07:15:23,6	07:15:24,6	F/O	(10-27).	(10-27).	
07:15:27,7	07:15:38,0		*Radio communication of another aircraft*	*Переговоры другого борта.*	
07:15:39,3	07:15:47,0		*Radio communication of another aircraft*	*Переговоры другого борта.*	
07:15:51,5	07:15:53,3	PIC	Radials, here everything is OK.	Радиалы, здесь всё нормально.	
07:15:52,6	07:15:53,4	A	*(illeg.)*	*(нрзб).*	
07:15:54,3	07:15:57,3	PIC	And localizer… and the landing heading *(illeg.)*?	А курсовой.. а курс посадки *(нрзб)*?	
07:15:57,3	07:15:58,6	F/O	20 miles told to report.	20 миль сказал доложить.	
07:15:58,6	07:15:58,8	Crew	Huh?	А?	
07:15:58,8	07:16:00,2	PIC	What is the distance now?	Удаление какое сейчас?	
07:16:00,9	07:16:02,1	F/O	Now we have 30	Сейчас у нас 30.	
07:16:02,9	07:16:04,3	F/O	20, I believe he said.	20, по-моему он сказал.	
07:16:04,3	07:16:04,8	PIC	Sure	Да-да.	
07:16:09,0	07:16:10,0	F/O	Won't we report?	Не будем докладывать?	
07:16:10,5	07:16:11,4	PIC	We will.	Будем.	
07:16:12,3	07:16:14,1	F/O	20, oh 30 miles.	20, ой 30 миль.	
07:16:37,5	07:16:38,4	F/O	(Yes-yes-yes).	(Да-да-да).	
07:16:38,9	07:16:40,7	PIC	Yes, 10-27.	Да, 10-27.	
07:16:41,2	07:16:41,9	PIC	Yes-yes-yes.	Да-да-да.	
07:16:43,2	07:16:43,7		*(illeg.)*	*(нрзб).*	
07:17:00,1	07:17:17,4		*Radio communication of another aircraft*	*Переговоры другого борта.*	
07:17:24,7	07:17:26,2		*Radio communication of another aircraft*	*Переговоры другого борта.*	
07:17:37,9	07:17:43,6	ATC	Papa November Hotel 9-7-1-4, squawk 1-3-7-3.	Papa November Hotel 9-7-1-4, squawk 1-3-7-3.	
07:17:45,1	07:17:47,4	25114	I have squawk 1-3-7-3.	I have squawk 1-3-7-3.	
07:17:49,8	07:17:54,1	PIC	Papa November Hotel 9-7-9-7 proceeding behind 9-7-1-4.	Papa November Hotel 9-7-9-7 proceeding behind 9-7-1-4.	

07:17:56,9	07:18:08,8	ATC	Papa November Hotel 9-7-9-7, maintain radial 0-9-0, report 2-0 miles Alfa Delta Sierra QNH 1-0-2-7.	Papa November Hotel 9-7-9-7, maintain radial 0-9-0, report 2-0 miles Alfa Delta Sierra QNH 1-0-2-7.	
07:18:09,0	07:18:17,6	PIC	1-0-2-7 will report 2-0 miles proceeding behind the helicopter (with proceeding in) company.	1-0-2-7 will report 2-0 miles proceeding behind the helicopter (with proceeding in) company.	
07:18:23,4	07:18:28,6	ATC	Papa November Hotel 9-7-9-7 squawk 1-3-7-4.	Papa November Hotel 9-7-9-7 squawk 1-3-7-4.	
07:18:28,9	07:18:30,3	PIC	1-3-7-4.	1-3-7-4.	
07:18:30,8	07:18:37,0	ATC	Papa November Hotel 9-7-1-4 squawk 1-3-7-3.	Papa November Hotel 9-7-1-4 squawk 1-3-7-3.	
07:18:41,9	07:18:42,6	PIC	13.	13.	
07:18:42,9	07:18:45,8		Seventy *(illeg.)*	Семьдесят *(нрзб)*.	
07:18:45,7	07:18:54,8		*Radio communication of another aircraft*	*Переговоры другого борта.*	
07:18:55,1	07:18:59,4		*Radio communication of another aircraft*	*Переговоры другого борта.*	
07:18:59,9	07:19:01,7	F/O	(13)74 set.	(13)74 установил.	
07:19:01,8	07:19:03,1	PIC	Yura, areyouflyingvisually?	Юра, ты визуально идёшь?	
07:19:16,1	07:19:16,6	PIC	Yura.	Юра.	
07:19:19,9	07:19:20,4	PIC	Yura.	Юра.	
07:19:21,7	07:19:23,2		*Radio communication of another aircraft*	*Переговоры другого борта.*	
07:19:23,2	07:19:26,0	PIC	You were just going lower, so, I cannot see you.	Вы ниже просто шли, это, я вас не вижу.	
07:19:26,8	07:19:30,0	25114	That's all, we have set the speed of 200, are leading for landing.	Всё, мы скорость 200 поставили, идём на посадку.	
07:19:30,1	07:19:30,7	PIC	Roger	Понял.	
07:19:30,8	07:19:33,9		*Radio communication of another aircraft*	*Переговоры другого борта.*	
07:19:35,4	07:19:40,2		*Radio communication of another aircraft*	*Переговоры другого борта.*	
07:19:40,2	07:19:40,9	F/O	I am looking for Seryoga.	Серегу ищу.	
07:19:40,8	07:19:41,9	F/M	The speed, captain.	Скорость, командир.	
07:19:42,1	07:19:44,0		*Radio communication of another aircraft*	*Переговоры другого борта.*	
07:19:49,3	07:19:50,9	PIC	Are you still flying visually, aren't you?	Вы визуально всё идёте, нет?	
07:19:53,2	07:19:53,7	25114	Once more.	Ещё раз.	
07:19:54,2	07:19:55,1	PIC	Are you flying visually?	Визуально идёте?	
07:19:56,4	07:19:57,0	25114	Yes-yes.	Да-да.	

07:19:57,4	07:20:01,0	F/O	Captain, (look) 270 to the left.	Командир, (посмотри) слева на 270.	
07:20:09,9	07:20:15,0		*Radio communication of another aircraft*	*Переговоры другого борта.*	
07:20:15,9	07:20:19,1		*Radio communication of another aircraft*	*Переговоры другого борта.*	
07:20:24,0	07:20:25,7	F/M	We are approachingthe ground.	Приближаемся к земле.	
07:20:25,7	07:20:27,8	F/O	Captain, the vertical is great five.	Командир, вертикальная большая пять.	
07:20:31,8	07:20:32,4	F/O	Ground is near.	Земля близко.	
07:20:32,4	07:20:33,4	F/M	50 meters.	50 метров.	
07:20:32,8	07:20:33,2	PIC	Silence	Тихо.	
07:20:33,7	07:20:34,6	PIC	Hush-hush.	Тихо-тихо.	
07:20:34,6	07:20:35,1	F/O	OK.	Нормально.	
07:20:35,3	07:20:35,7		*(illeg.)*	*(нрзб).*	
07:20:36,3	07:20:36,9	F/M	Forty (*illeg.*)	Сорок *(нрзб).*	
07:20:36,8	07:20:37,3	PIC	Enter.	Введи.	
07:20:39,8	07:20:40,7	F/O	Have passed away.	(Прошли).	
07:20:39,9	07:20:41,4	PIC	Enter by the GPS.	По GPSу введи.	
07:20:42,8	07:20:43,8	F/O	Two hundred seventy.	Двести семьдесят.	
07:20:43,8	07:20:44,8	Crew	To the left at 10.	Влево в 10.	
07:20:49,2	07:20:57,2	25114	Bole-Tower, Papa November Hotel 9-7-1-4 2-0 miles inbound radial 0-9-0.	Bole-Tower, Papa November Hotel 9-7-1-4 2-0 miles inbound radial 0-9-0.	
07:20:57,2	07:20:58,3	Crew	We have 23.	У нас 23.	
07:21:01,9	07:21:10,8	ATC	Papa November Hotel roger remain clear of the final approach (5-4 runway) position orbit *(illeg).*	Papa November Hotel roger remain clear of the final approach (5-4 runway) position orbit *(illeg).*	
07:21:12,6	07:21:15,9		Affirmative... orbit, left orbit.	Affirmative... orbit, left orbit.	
07:21:17,5	07:21:18,6		*(illeg)* zero, left orbit.	*(illeg)* zero, left orbit.	
07:21:20,3	07:21:21,0		*(illeg.)*	*(нрзб).*	
07:21:23,7	07:21:24,3	PIC	And for us too?	И нам тоже?	
07:21:25,2	07:21:26,6	PIC	What distance do you have?	Какое у вас удаление?	
07:21:27,2	07:21:28,7	25114	We have 23.	У нас 23.	
07:21:30,0	07:21:39,4	PIC	Papa November Hotel 9-7-9-7 making left orbit on my present position... 2-3 miles inbound correctly.	Papa November Hotel 9-7-9-7 making left orbit on my present position... 2-3 miles inbound correctly.	

07:21:40,2	07:21:41,7	ATC	(Remain) *(illeg).*	(Remain) *(illeg).*	
07:23:22,1	07:23:24,0		*(illeg.)*	*(нрзб).*	
07:23:24,8	07:23:29,2	Another	Alpha Whisky *(illeg).*	Alpha Whisky *(illeg).*	
07:23:33,1	07:23:34,4	F/O	Captain, to the left 10	Командир, влево 10.	
07:23:42,2	07:23:42,5	PIC	Yura.	Юра.	
07:23:43,7	07:23:43,9	25114	Yes	Да.	
07:23:44,8	07:23:45,5	Crew	Were you given the approach?	Дали тебе заход?	
07:23:45,9	07:23:46,6	25114	(Left /no) orbit.	(Left /нет) orbit.	
07:23:46,7	07:23:47,5	Crew	*(illeg.)*	*(нрзб).*	
07:23:48,9	07:23:52,3	25114	Bole-Tower Papa November Hotel 9-7-1-4 continue left orbit.	Bole-Tower Papa November Hotel 9-7-1-4 continue left orbit.	
07:24:00,0	07:24:01,4	PIC	Seryozh, and what altitude do you have?	Сереж, а какая у вас высота?	
07:24:03,3	07:24:07,5	25114	And, altitude, pressure altitude 7-6-0 two four hundred.	А, высота, по давлению 7-6-0 две четыреста.	
07:24:08,2	07:24:09,3	25114	Two four hundred twenty.	Две четыреста двадцать.	
07:24:12,0	07:24:12,8	PIC	Above the clouds?	Над облаками?	
07:24:13,7	07:24:14,6	25114	And, in clouds.	А, в облаках.	
07:24:16,3	07:24:16,6	PIC	Roger.	Понял.	
07:24:19,6	07:24:20,9	PIC	And… Have felt the ground.	А.. Землю нащупали.	
07:24:25,7	07:24:26,7	F/M	And there at all behind.	А там вообще сзади.	
07:24:31,3	07:24:32,3	F/O	What distance do they have?	Какое у них удаление?	
07:24:35,8	07:24:38,3	25114	(Bole-Tower, Papa November Hotel) 9-7-1-4.	(Bole-Tower, Papa November Hotel) 9-7-1-4.	
07:24:40,8	07:24:42,0	PIC	How many miles do we have of the distance.	Сколько у нас миль удаление?	
07:24:44,7	07:24:45,8	F/O	We have twenty one.	У нас двадцать один.	
07:24:47,2	07:24:50,6	25114	Bole-Tower, Bole-Tower, Papa November Hotel 9-7-1-4.	Bole-Tower, Bole-Tower, Papa November Hotel 9-7-1-4.	
07:24:51,0	07:24:51,5		*(illeg.)*	*(нрзб).*	
07:24:51,7	07:24:59,4	25114	(Papa November Hotel) 9-7-1-4 *(illeg)* continue approach on radial 0-9-0.	(Papa November Hotel) 9-7-1-4 *(illeg)* continue approach on radial 0-9-0.	
07:24:58,3	07:24:59,4	F/O	Captain, push the sti…	Командир, от себя ру...	
07:24:59,8	07:25:01,5	PIC	Pull the stick *(illeg.),*mugs.	На себя ручку *(нрзб)*, мужики.	

07:25:00,6	07:25:01,5	Crew	(22)	(22).	
07:25:01,5	07:25:02,6	F/M	(Farewell), mugs.	(Прощайте), мужики.	
07:25:02,3	07:25:03,3	***RI-65***	***Failure… (failure..)***	***Отказ..(отказ..)***	

Designations:

PIC	- pilot-in-command;	Crew	- unidentified crew member;
F/O	- first officer;	A	- unidentified speaker;
F/M	- flight mechanic;	(Leaving)	- possible content of the sentence;
ATC	- air traffic controller;	*(нрзб),(illeg)*	- illegible sentence;
25114	- radio communication of helicopter 25114;	GPWS	- ground proximity warning system;
Another	- radio communication of another helicopter;	RI-65	- voice warning system.

Notes:

1. In bold italics the service information is given.
2. The time is exposed by the ATC tape recorder transcription.
3.The voices identification was performed by:

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