MINISTRY OF CIVIL AVIATION

The final technical report of the accident of the cargo aircraft operated by AERO LIFT registered S9-SVN of type : AN-12B while taking off from the runway 02 in Luxor airport Flight No. LFT 1015, destined to the airport NIKOLAEV ,Ukraine in 20/2/2009

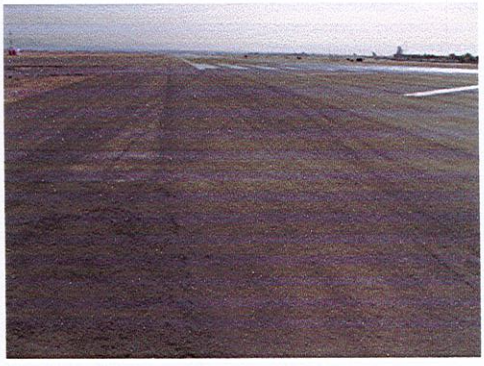
Table Of Contents

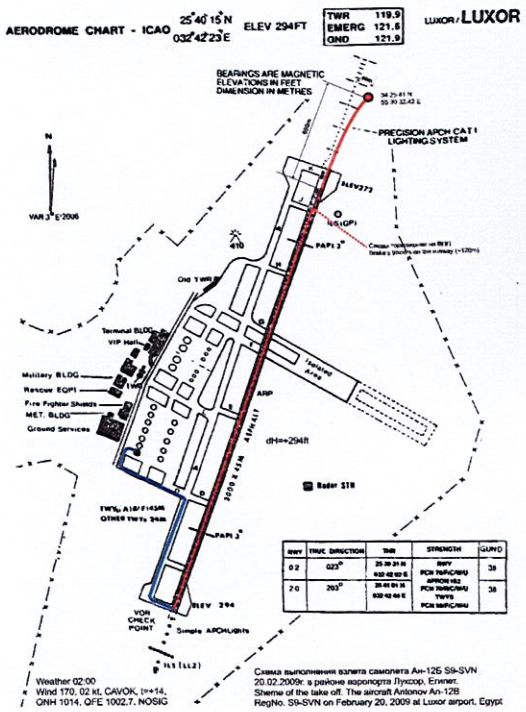
1 FACTUAL INFORMATION

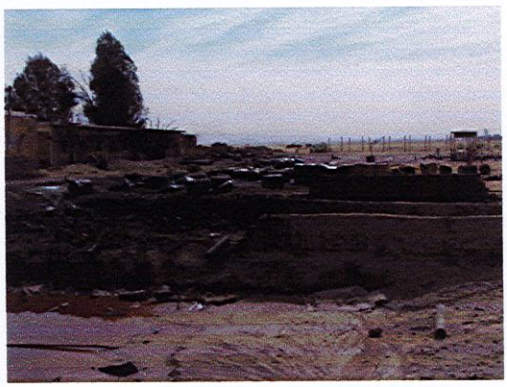
1.1 HISTORY OF THE FLIGHT

- On 19/2/2009 at 2303UTC the aircraft registered S9-SVN operated by AERO LIFT Antonov AN-12B (cargo) landed in Luxor airport coming from Entebbe Uganda airport, flight no. LFT 1015 (Ferry Flight), for refueling and had on board a crew of 5 members; Pilot, Co. Pilot, Navigator, Flight Engineer, in addition of a companion maintenance engineer
- . The airplane was planned to continue the flight to Airport Mykolev (Ukon), Ukraine to conduct a maintenance work there. The airplane stopped on the stand 14B in Luxor Airport Apron.

- The aircraft was refueled with 19000 liters of fuel (about 14 tons), other than what it had in its fuel tanks (2 tons), enough for 8 hours flight. A/C handling was offered by "EgyptAir For Maintenance And Engineering Company" but was limited to providing Chocks and Passengers stair only.
- On 20/2/2009 at 0203 the aircraft was cleared to start the engines and the ATC provided the crew with air pressure data (QNH was 1014), and the runway to be used for take off (R/W 02). The engine starting was performed by the aircraft crew and none of the handling company personnel was present.
- At 0209 the aircraft was cleared to taxi to runway 02 holding point via D & A taxiway and was given ATC clearance.
- At 0215 the aircraft was cleared to line up. The surface wind speed was given as calm. At 0217 the aircraft was cleared for take off.
- The aircraft started rolling on the runway 02 for take off but it kept rolling on it till it reached its end. The aircraft continued rolling in the sand drifting from the runway centerline to the right, crossing a service road to crash into a military zone (500 meters from the runway end).







- The aircraft crashed into one of the buildings inside the military unit causing complete destruction for the building. The right wing also crashed into another building putting the aircraft on fire and forcing the aircraft to turn right. The aircraft kept moving forward to the military unit fence (next to Tiba-Luxor road) and stopped there, crashing in its way into oil barrel.
- The accident resulted in total destruction and fire in the aircraft and the fatality of its crew but no further injuries.

1.2 INJURIES TO PERSONS

Injuries	Crew	PAX	Others	Total
Fetal	4	NONE	On board GROUND MECHANIC	5
Serious	NONE	NONE	NONE	NONE
Simple/Without	NONE	NONE	NONE	NONE

1.3 DAMAGE TO AIRCRAFT

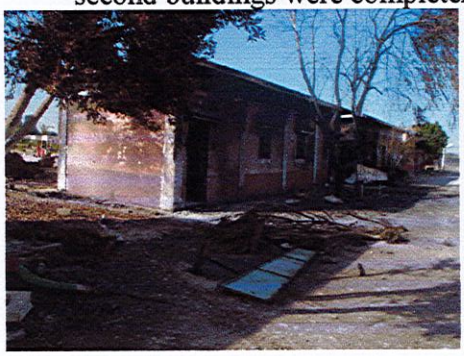
- The aircraft was completely destroyed.

1.4 OTHER DAMAGES

The two military buildings which the aircraft crashed into were damaged as follows:

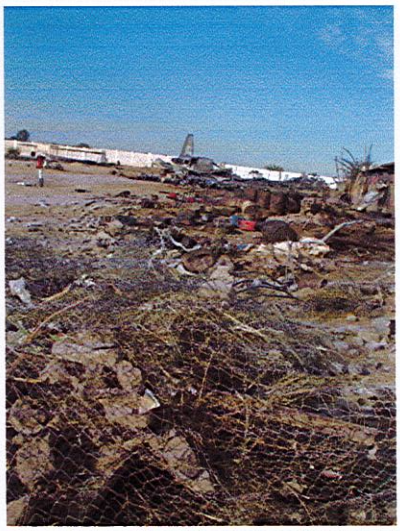
1.4.1 First Building (Water Buildings)

- A part of the south wall and a part of the building's ceiling were destroyed. Several fire marks on the building and also severe fire marks on the two buildings next to first building were detected. The contents of the first and second buildings were completely burnt.



1.4.2 Second Building (Fuel Buildings)

- One of the buildings at which the aircraft wreckage was found inside it was completely destructed. A part of the fence of the unit located on the Tiba-Luxor road was destroyed.
- Several engine vehicles oil barrels were burnt.
- The fence between the airport borders and the military zone was destroyed by 10 meters and the fence between the two units was destroyed.



1.5 PERSONNEL INFORMATION

1.5.1 PILOT

- Russian- 54 yeas old.
- A Balashov Military Flight School graduate in 1976.
- Holds a class AII pilot license No. IIP010877 issued in 19 March 1998 and valid till 29 December 2009.
- Last medical check performed on him was in 29 December 2008.
- Total Fighting hours of 2000 hours.
- No available information about his qualifying and experience on the type as pilot and as a copilot from the Russian CAA and that is according to the statement of Russian IAC participating in the investigation as an accredited representative from the Russian Union.

1.5.2 CO-PILOT

- Ukrainian- 55 years old.
- A Balashov Military Flight School graduate in 1975 and had a refreshing training in 1/11/2008.
- Holds airlines pilot license class I ATPL, TA No. 001309 issued in 29/9/2005 issued by Ukrainian Safety Oversight Agency.
- Has experience on the type of 6397 hours and night flying hours of 2084 hours.
- Holds a medical certificate No. 00905 valid till 6/11/2009.
- Last qualifications test was in 7-8/5/2008 and got "C" mark.

1.5.3 NAVIGATOR

- Russian- 55 years old.
- Kirovograd Navigation School graduate in 1975 and had 15000 flight hours experience.
- Holds a navigator license AII No. II III001753 issued on 24/1/1997, valid till 21/8/2009.
- Last medical test performed on him was in 21/8/2008.
- No available information in the Russian CAA about his in flight hours and qualifications rating or his history on the AN-12B as a navigator.

1.5.4 FLIGHT ENGINEER

- Russian- 59 years old.
- Irkutsk Military Flight Technical School graduate and had 16000 hours experience as a flight engineer.
- Holds a flight engineer license No. III003919 valid till 15/10/2009.
- Last medical test performed on him was in 15/10/2009.
- No available information in the Russian CAA about his in flight work check and qualifications rating or his history on the AN-12B as flight engineer.

1.5.5 MAINTENANCE ENGINEER

- Ukrainian- 39 years old.
- No available information about him in the Russian CAA.

1.6 AIRCRAFT INFORMATION

1.6.1 The Aircraft

- The aircraft Antonof AN-12B was manufactured by Tashkent Chkalov Aviation Enterprise in 31/8/1966 with serial No. 6344310. The last registration for the aircraft before the registration of the accident was in Moldavia.

- The aircraft was owned by AERIANTOR-M Company in Moldavia and has a service life of 40 years and 8 months. The period between each of its overhauls is 16 years and 11 months with maximum take off weight of 61 tones.
- Three overhauls were carried out on the aircraft; the last was in 21/4/1990

- The Russian IAC stated that the Antonof design office assigned a service life limit of the aircraft that expires in 2005. [1]
- There was a contract between Aviaxizmat (Fergana mechanical Plant) and the operator AERIANTOR-M to perform the required maintenance tasks according to the order No. 12/4310 in 12/3/2006 to extend the aircraft service life.
- Aviaxizmat company performed the maintenance tasks for that type according to the request handed to it by the operator in 19/10/2005 and consequently, the state of Moldavia issued a certificate of release to service No. 122 in 4/4/2006 (on condition that it is checked by assistants) and the aircraft was released to service according to Aviaxizmat decision.
- According to this certificate:
  - The registered ER-AXI of type AN-12B and its serial No. 6344310, had 40 years and 8 months service life (13500 hours and about 7500 cycles), consequently on the maintenance operations performed on it, will be released to service till the next overhaul (the period between two overhauls is 16 years and 11 months) and the next overhaul is due in 21/4/2007 with 8300 flying hours and 3000 cycles.
  - If the worthiness of the parts and appliances on the aircraft is not longer valid before the due date of the next overhaul (21/4/2007), it will be operated according to service life limitations specific inoperational bulletin 2075 (LIST E 12-0027 -000).
  - The parts and appliances which are not mentioned in the above list will be operated according to the service life of the aircraft.
  - consequently, the aircraft should be operated according to current operational and maintenance regulations of the state of Moldavia and the annual checks by the CAA of the sate of Moldavia to extend the airworthiness of the aircraft.
  - The state of the operator AERIANTOR –M shall log the faults of operation during the operation of the aircraft.
  - The aircraft had the following data at the certificate No. 122 release:
    - Total flying hours of 11692.
    - Total cycles of 6451 cycles.
    - 6859 flying hours since the last maintenance.
    - 2272 cycles since the last maintenance.
  - The work on the aircraft started in 23/11/2005 and ended in 4/4/2006 for 4 months and 15 days.

- AERIANTUR-M ended its business in 16/1/2007 after an accident for one of its aircrafts in Balad airport in Iraq.
- The aircraft was sold for Victor Zelinyok and the last airworthiness certificate for the aircraft was issued ~~by~~ under the No. MA-1552 by the Moldavian CAA and was valid till 21/4/2007.

[1] The following is the statement from the Russian IAC "for your information; according to the data from Antonov Design Bureau, the assigned service life limit of the aircraft expired in 2005"

- The original documents of the aircraft (except the operation certificate) were returned to the Moldavian CAA and despite that, there was information that the aircraft kept on flying.
- The registration of the aircraft at Moldavia was ended in 27/5/2008 as a result of the loss of data about he airworthiness of the aircraft and its location since 21/4/2007 (as the aircraft was holding a C.O.A. No. MA 155 issued by Moldavia CAA and expired in 21/4/2007).

- ICAO and the state of Congo was notified with letters No. 1517 & 1512 dated 28/5/2008 and also the operator AERIANTUR-M was notified by a letter No. 1514 dated 28/5/2008 with the above information.
- Last performed check on the aircraft was a C check in the workshops of Volga Dnepr company in UAE in the period 5/3/2007 to 6/5/2007 and its total flying hours was 11982 hours and its total cycles was 6548 cycles and 7149 flying hours and 2369 cycles since last overhaul. Based on that, a Maintenance Release Certificate No. 070 was issued.
- In 1/11/2007 an incident occurred to the aircraft in Kinzangany, Congo and one of the engines came on fire, with also a defect in a wing, and a defect in the main landing gear. The aircraft was grounded for a while
- In 2008, Inter Sky contacted the Antonof design office (the manufacturer) in Kiev, Ukraine which in turn, informed Inter Sky that the aircraft is not under the prolongation work that was supposed to be done by Fergana Aviation Plant. There was a contract between the manufacturer and Inter Sky in 5/9/2008 to perform a mass maintenance program for the aircraft to cope ~~coop~~ with the most recent maintenance requirements.
- In 20/2/009 the aircraft was in its way to Ukraine to perform maintenance according to the contract between the manufacturer and the Inter Sky No. 08/08 after it was registered by the No. 01/09 as certificate of temporary register in the state of Sao Tome in 21/1/2009 valid till 20/2/2009 (the day of the accident) and with registration marks S9-SVN. A special flight permit was issued for it by the No. 03/09 airworthy for a ferry flight valid till 20/2/2009 between Kinzangany airport, Congo and Mykolev Ukon airport, Ukraine. The permit- and the registration were for Aero Lift Company Limited.
- An insurance certificate was issued for the aircraft by the No. 7150000 1/1 in 12/2/2009 and valid till 18/2/2009 and its data is as follows:
    - Insured: Inter Sky (PTY) LTD.
    - Insurer: CCIC INSURER CCIC(insurance company) ARMA
    - Covered by Person Aero Lift Company

  And this was to perform a Ferry Flight from Entebbe, Uganda to Kiev, Ukraine using a rout passing by Luxor airport with 2 flights, 2 take off, and 2 landings and the insurance value was ten million US dollars for the third part.

1.6.2 Engines Information

- The Aircraft's engine data is as follows:

	ENGINE 1	ENGINE 2	ENGINE 3	ENGINE 4	APU

TYPE	AI-20M	AI-20M	AI-20M	AI-20M	TG-16M
SERIAL NUMBER	N29146004	N27516049	N24446060	N296121	OM11 60207 1
TOTAL FLIGHT HOURS	6596	18841	5131	17852	229
FLIGHT HOURS AFTER LAST REPAIR	--	4129	1062	2852	120

And according to the Moldavia CAA information, the 4 engines were of AI-20M type.

1. **Engine No.1:** Serial No. N2914004 manufactured by Motor Seach in 3/12/1991 and had never been overhauled never had an overhaul. The engine was mounted on the aircraft in 9/3/2003 and still have an expected life time of 4750 hours or 7 years and had a flight time since in operation: 6886 hours and landings: 2024 and the hours was extended between the overhauls to 500 hours to be 7700 hours till 2/12/2007.
2. **Engine No.2:** Serial No. N27516049, production date: 19/2/1972. Three overhauls were performed on it; last one was in 30/5/1992 in a military base. Overhaul service life 3000 hours, 13 years. Mounted on the aircraft in 28/11/2003 and still have an expected life time of 3000 hours or 7 years and had operating hours of 19131 hours since in was in service for the first time and 5304 landings.
3. **Engine No.3:** Serial No. N24446060 production date: 17/12/1974. Two overhauls were performed on it, last one in 28/11/1990 in a military base. The service time between two successive overhauls: 4000 hours or 13 years. Mounted on the aircraft in 25/10/2004 and was still having an expected life time of 4000 hours or 7 years. Had operating hours of 5421 hours and number of landings of 1735. Operating hours since last overhaul: 1325 hours and 402 landings and the hours between the overhauls were extended to 1/12/2007 (12 months).
4. **Engine No.4:** Serial No. N2946121 (the information does not match the engine information in the logbook found in the accident location), production date: 29/11/1969. Four overhauls were performed on it last was in 12/1/1992 in a military base. The service time between two overhauls is 4000 hours or 13 years. Mounted on the aircraft in 8/12/2003 and still have and had an expected life time of 4000 hours or 7 years. Had operating hours of 18142 and 6378 landings. Operating hours since last overhaul: 3142 hours and 991 landings and the hours between the overhauls were extended to 12/1/2008 (12 months).

1.6.3 Information About the Propellers

- The four propellers are of AV-68I-04A type.
- The data about the propellers from the Russian IAC (which was obtained from the Moldavian CAA when the aircraft was registered in Moldavia by the registration marks: ER-AXI), are as follows:

PROPELLER NO.	FLIGHT TIME SINCE OPERATIONS (HOURS)	TIME SINCE LAST OVERHAULS (HOURS)	NO.OF OVERHAULS	OVERHAULED STATION
N 069390073	11738	2843	2	-
N 112280706	9953	643	3	STARAY A RUSSA MAINTENANCE PLANT (1996)
N 110260594	9871	1866	2	BYKOVO AVIATION REPAIR PLANT (402) (MOSCOW)
N 128240634	13761	1866	2	BYKOVO AVIATION REPAIR PLANT (402) (MOSCOW)

- In 1999 maintenance was performed on the four propellers separated from the aircraft without disassembling the assembly as adjustment, painting & balance work was performed on it in STARYA RUSSA MAINTENANCE PLANT.
- The above data were found to be not matching with the numbers on the propellers in the accident location. The propellers were holding different serial numbers (refer to the "Wreckage and Impact Information" subtitle 1-12).

1.7 METEOROLGICAL INFORMATION

- According to the reports of the General Metrological Board about the forecast of Luxor airport in the period 0300 to 0500 local timing in 20/2/2009, the forecast was as follows:

Time (UTC)	Wind Direction	Wind speed (knots)	Visibility	Climate phenomena	Clouds	Temp.	Dew point	Atmosph. pressure
0100	160	03	10 km	_	_	15°c	02	1014
0200	170	02	10 km	_	_	14°c	01	1014

0300	160	04	10 km	_	_	12°c	04	1014

1.8 AIDS TO NAVIGATION

- The used runway is equipped with: **ILS, LLZ, DME, VOR, LO**.

1.9 COMMUNICATIONS

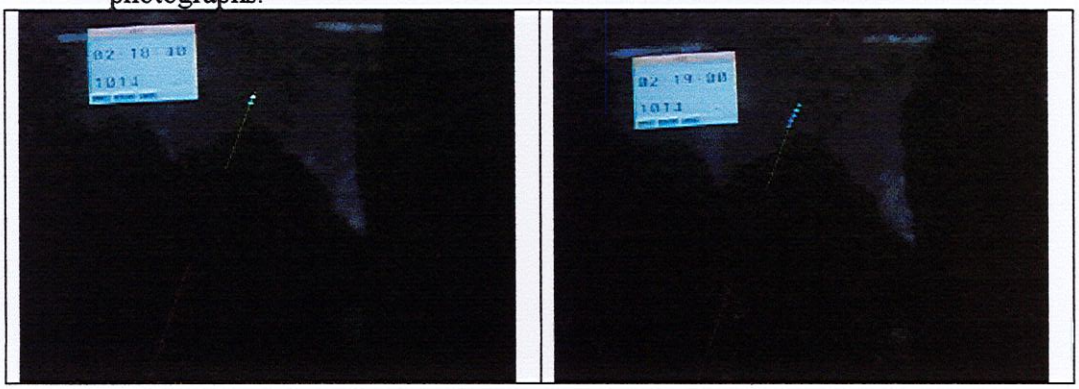
1.9.1 Aircraft communications with Luxor ATC concerning the accident flight

The communication between the pilot and Luxor International Airport ATC was as follows:

- At 02 03 08 UTC, the first contact between the crew and the ATC.
- At 02 03 20 local timing, the pilot cleared that the landing airport is Ukon, that he has fuel enough for 8 flying hours, 5 persons were onboard and he demanded a declaration to start the engine and he was cleared to do so. He was informed that the used runway is 02 and that QNH is 1014 and the pilot replied that he received the information.
- At 02 10 00, the pilot demanded to Taxi and he was cleared to move to the runway point through the Taxi ways D, A and the crew replied that the information was received.
- At 02 12 02, the ATC informed the pilot: Cleared TO destination Ukon via A727N, FL200, and change in route squake 2716 and the pilot replied that he copied the information.
- A 02 12 50, the ATC asked if there were PAX on the aircraft and the pilot replied that there were only 5 crew members on the aircraft and no PAX.
- At 02 15 35local timing, the aircraft was cleared to enter LINEUP and the wind speed was given (wind calm) and the ATC gave its instructions: "Climb FL200 direct A451 AST cleared for take off RWY 02" and the pilot replied that he received the information.
- In 02 18 00 the conversation was ended.

1.9.2 Luxor airport radar screen for the aircraft

- The aircraft appeared on Luxor airport radar screen near to the end of the runway at 02 18 37 UTC. The drift in its path to the left appeared on the screen till it disappeared on the screen at 02 19 00 UTC as in the following photographs.



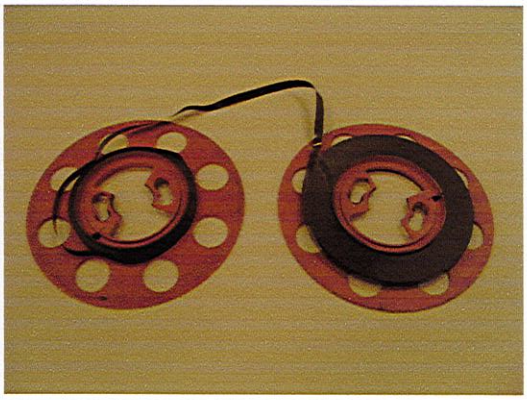
1.10 AERODROME INFORMATION

- Runway 02 was used in Luxor airport. It has a length of 3000 meters, width of 45 meters and tarred and its taxi ways with asphalt. The tarring strength is PCN70/F/C/W/U. The highest level in the airport (the height of the highest point in the runway) is 294 feet and the Longitude and latitude of the runway 02 are: 253930.79N, 0324202.49E.

1.11 FLIGHT RECORDER

1.11.1 FLIGHT DATA RECORDER

- The aircraft is supplied by 2 FDR devices composed of magnetic tape of MSRP-12 type.
- The first tape is delivered on two spools (which is disassembled from its place on the aircraft) and the second tape delivered on one spool (which is the one which was found between the wreckage of the aircraft in the accident location)
- Both tapes had no signs of being subjected to high temperature influence or mechanical damage. On one of the first tape spool, the following was written: 26098 HOBAR, LPM NO. 33631 IMF.



1.11.2 COCKPIT VOICE RECORDER

- The aircraft is supplied with two devices; one is the main and the other is standby and both are of type: MS-61B.
- The CVR is composed of a metal wire connected and winded on two pairs of spools. The wire was sound with no signs of high temperature influence.

- For the main recorder; the feeding spool (code: 003 and serial No. 8779204) there was no metal wire but the receiving spool (serial No. 9371414), 0.75 of the wire is winded around it.
- For the standby recorder; feeding spool (serial No. 9231673), 0.85 of the wire is winded around it and for the receiving spool (serial No. was not clear) 0.15 of the wire is winded around it.

- The FDR and CVR were unloaded in Air Accident Scientific and Technical Support Commission in Russia (the records of the FDR calibration was found in the wreckage location which was used to decode the FDR data).

1.11.3 Tapes Investigation:

1.11.3.1 The Main FDR

- The FDR tape was in a good condition.
- The list of parameters resulting from unloading the FDR is the same as the actual list of the FDR type.
- The duration of the data recorded is 1 hour and 15 minutes.
- There was no recorded data related to the accident.
- The system MSRP-12 recorded data showed information about level flight and approach and landing. This was the last recorded flight on the tape.
- The recorded flight Data showed that the landing was normal without any failures in an airport with a height of 900 meters.
- From the previously mentioned, it is clear that the magnetic tape of type MSRP-12 which was disassembled from its place on the aircraft does not have any data that relates to the accident.

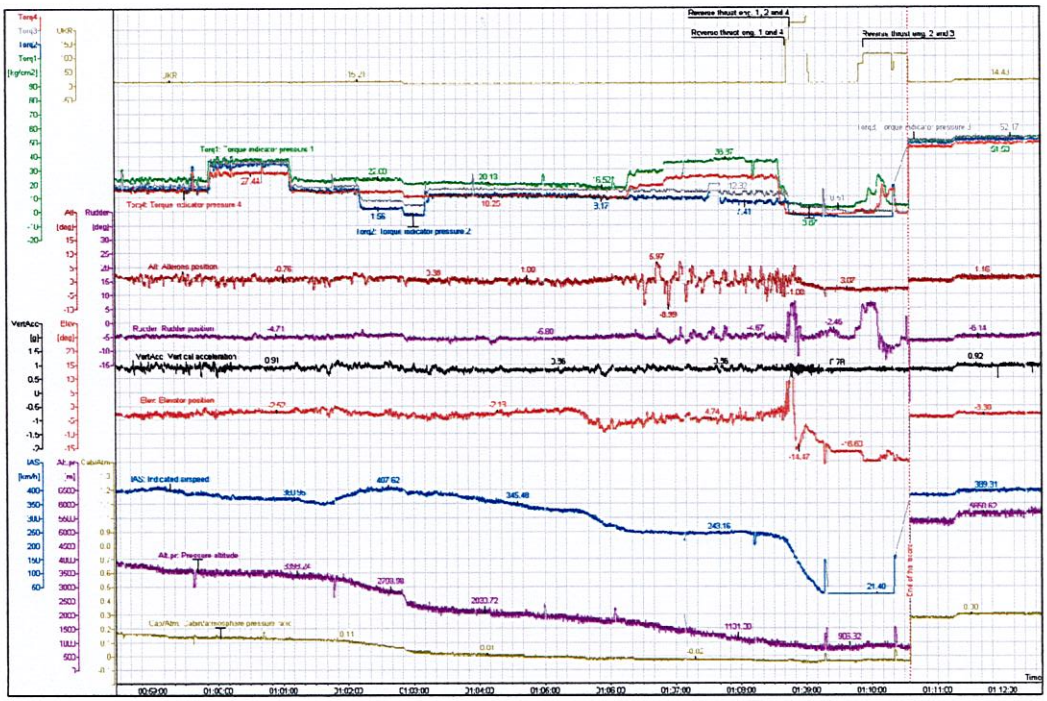
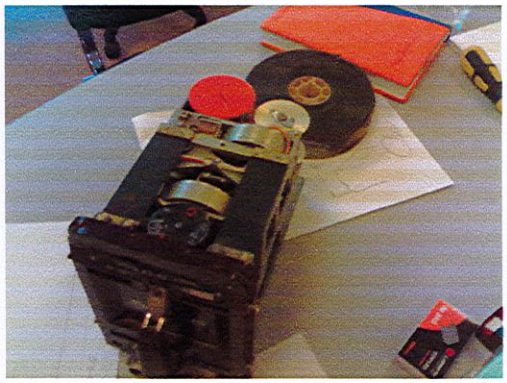


Fig.19. The FDR MSRP-12 of the aircraft An-12B S9-SVA flight information.

1.11.3.2 The Standby FDR



- The FDR is sound.
- The list of parameters resulting from unloading the FDR is the same as the actual list of the FDR type.
- The duration of the data recorded is 2 hours and 9 minutes.
- The system MSRP-12 recorded data showed information about climb, level flight, and approach and landing. This was the last recorded flight on the tape.
- From the previously mentioned information, it is clear that the magnetic tape of type MSRP-12 which was disassembled from its place on the aircraft does not have any data that relates to the accident.

1.11.3.3 The Main CVR

- The duration of recorded conversations on the receiving spool is 5 hour and 7 minutes; including recording information about the performance of the aircraft for the technical checks which were performed in Volga-Dnepr labs.

- The crew conversation in the flight between Shardja airport and Djibouti airport for two hours and 55 minutes and on the waiting points (Daket, Kilit, and Maskat).
- The crew conversation in the flight from Salal to Djibouti for 57 minutes,The flight passed on the points (Adis-Ababa, Rejava, Kabit) while the aircraft had the registration marks: ER-AXI.

1.11.3.4 The Standby CVR

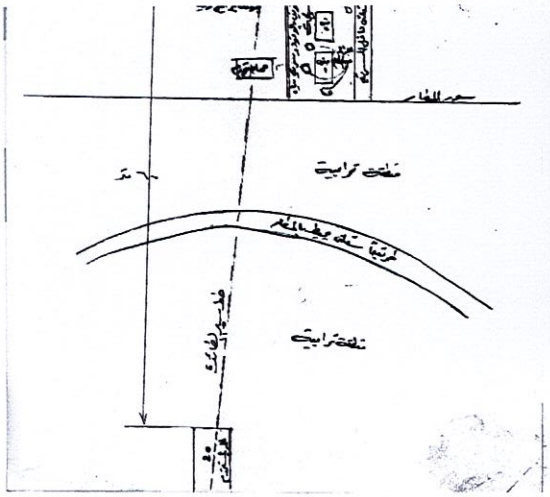
- The duration of recording on the receiving spool is 1 hour and 29 minutes.
- The recorded information about the technical checks performed in 19, 20/3/2007. These checks included aircraft disassembly works made in Volga-Dnepr labs.
- The crew conversation during the take off from Djibouti for 23 minutes and the waiting points (Mabutv, Lagbi).

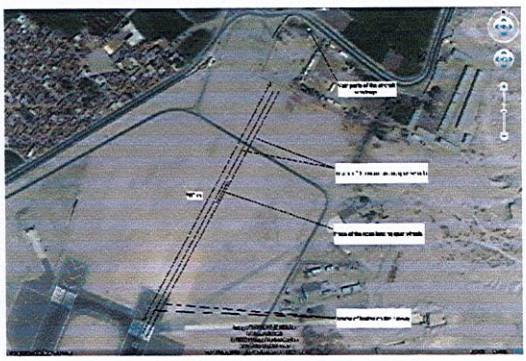
The data on both the main and standby CVR's, has no relation to the accident.

1.12 WRECKAGE AND IMPACT INFORMATION

1.12.1 Accident Site

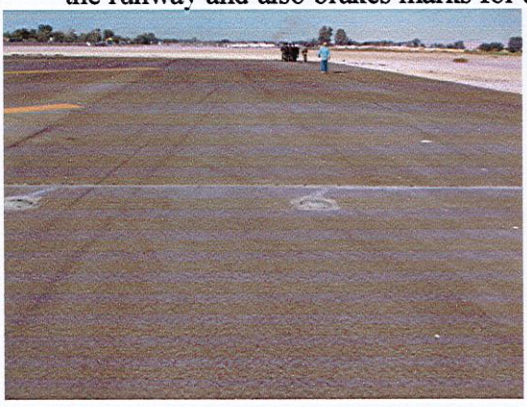
- The aircraft rolled to the end of the runway 02 and got over it to a sandy area then crossed the road around the airport (service road), and then another sandy area till it crashed into the airport fence to get over it to enter a military zone for about 500 meters.
- The aircraft kept moving 100 meters after the airport fence till it crashed into the military zone fence on the Tiba-Luxor road and was destroyed as a result of that. The longitude and latitude of the place where the aircraft stopped at are: 18.86'25 41N, 56.64'32 42E.
- The wreckage was scattered on an area of 150 meters x 10 meters and there was no wreckage outside this area except the left wind lying across Tiba-Luxor road.
- After entering the military zone, it rolled for 90 meters away from the used runway 02 center line.

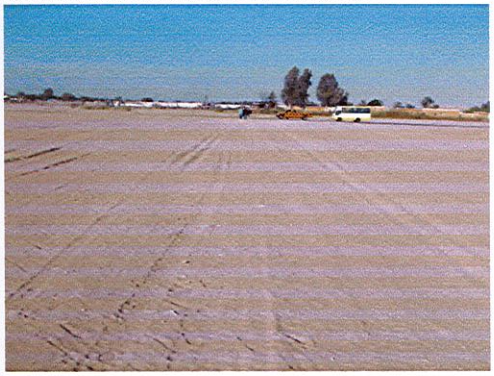


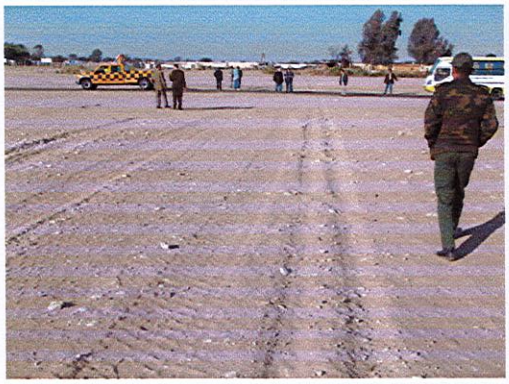


1.12.2 Runway 02 at Luxor Airport

- Tire tracks for the aircraft were found drifting to the right for a distance of 10 meters till the end of the runway.
- There were tracks for the main wheel assembly in the sandy area outside the runway and also brakes marks for a distance of about 450 meters.







1.12.3 Aircraft wreckage

- After the aircraft crossed the airport fence, some of its parts were scattered but there was no sign of fire on it. The parts are:
    1. Landing gear fairing (right).
    2. Fuel panel of right landing gear bay.
    3. Fuel filter from the right landing gear nacelle.
    4. Part of the right outer wing with aileron and trimmer.
- After the above parts were torn off the aircraft, it crashed into a small service building inside the military zone and ~~which~~ was totally destroyed.
- The right wing crashed into another building causing the aircraft to catch fire and there were signs of fire on the side of the building (part of the right middle wing and upper skin panel of the right wing).
- The wreckage scattered (which has signs of fire on it) along the path of the aircraft on both sides; right and left but more intensively on the right side as follows:
    1. Part of the right flap with deflector.
    2. Right landing gear door.
    3. Right flap.
    4. Part of the right outer wing with wing tip.
    5. Part of the right middle wing..
    6. Engine 4 exhaust cone.

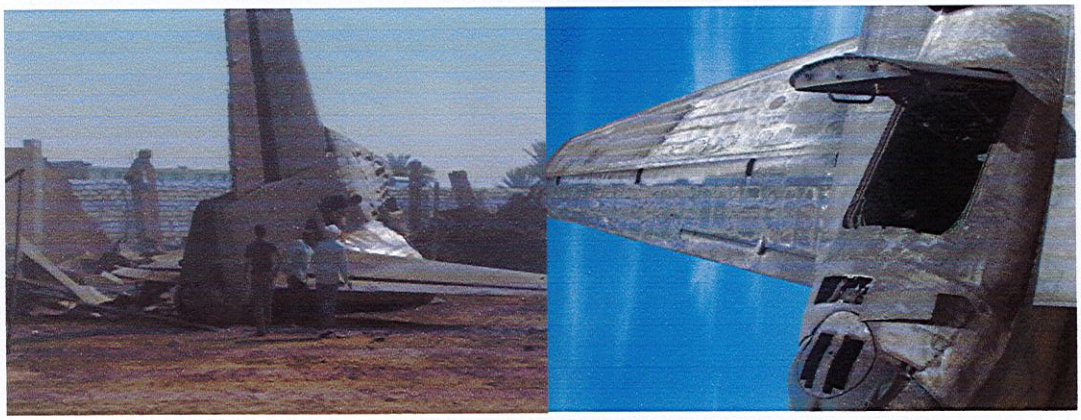
  And on the left side as follows:
    1. Nose Landing gear small door.
    2. Jackscrew of the right flap.
- The aircraft crossed in its path two trenches with a depth of 1.5 meter. It crashed after that into engine oil barrels to turn to the right and keep moving forward till the military unit fence and stopped there (along the fence) so that its front was to the east and the tail unit to the west.
- The left wing with both of its engines laws was found lying outside the military unit fence after it has been destroyed and crashed into it, crossing the asphalt road Tiba-Luxor, severely burnt and melted in some parts.

1.12.3.1 THE COCKPIT AND CARGO COMPARTMENT

- The frames No. 9-13 were in a complete destruction status and the fire turned it to aches (some fragments from the steel light fragments and the cockpit cover).
- The cargo compartment (the frames from No. 13 to 43) was totally destroyed and the fire turned it to ashes.

1.12.3.2 TAIL UNIT

- Frames 43-47 were totally destroyed and the fire turned them to ashes.
- Left tail unit was partially destroyed, elevators were found in the max upward position at 28 degrees, and the rudder was found on 20 degrees to the left.
- Right stabilizer was found broken near the fifth rib.
- Fin tip was found destroyed due to its collision with the concrete fence.



1.12.3.3 WINGS

- Intermediate wing, panel right outer, collided into the military unit buildings and caught fire. Its parts were found in destruction and burnt state next to the military unit buildings.
- The flaps and ailerons of the right wing were found next to the building into which the aircraft crashed and the remaining of the rear spar of the upper right intermediate wing panel (11-13 NK) were found as shown in relevant photographs.

- The aileron, elevator and rudder control linkages were burnt in the ground fire. The remaining rod fittings were finger tight and locked. All the flight control damage resulted from the impact and the ground fire.
- Three flap jackscrews were found at the site of the aircraft collision with the buildings and the ground.

- All the structures in the fire cell were burnt or partially damaged. The flap control linkage damage was static and appeared as a result of the impact.
- The An-12BP fuel system consists of 26 flexible symmetric fuel tanks in the wings, box tanks and three standbys under floor tanks.
- After the impact and ground fire, the fuel system were found damaged and burnt (tanks, fuel pumps, taps, valves and pipes). Some fragments of the fuel pipelines were left. The pipeline attachments that were still intact by the fire were finger tight and locked.
- The fuel system was damaged.
- Fragments of the following systems were found at the accident site:
  - hydraulic system;
  - anti-ice and air conditioning systems;
  - fire protection system;
  - Oxygen supply system.
- The systems were damaged by the impact forces and burnt in the ground fire.

1.12.3.4 FLIGHT CONTROL

- Movable surfaces; ailerons, elevators, rudder control linkages, were destroyed and burnt and the rod fitting were finger tight and locked.

1.12.3.5 A/C SYSTEMS

- The fuel system (tanks, fuel pumps, taps, valves, and pipes) were destroyed because of the collision and fire forces.
- The remaining of the hydraulic system was found. The following systems were also found:
  - Anti-ice and air conditioning system.
  - Fire protection.
  - Oxygen supply system.
- All the avionics equipment that were in the accident site were in a severe state of total destruction and burn.

1.12.3.6 Landing Gear

- The Nose landing gear was found without tires (burnt).
- Left main L/G was found near the big part of the wreckage partially destroyed.
- The bad status tires:

Right main L/G found 50 meters away from the wreckage and partially destroyed.

1.12.3.7 ENGINES

- The four engines were found in the accident site. They were severely burned and all the propellers were separated, severely deformed and burnt and the blades were scattered in different places.
- Engines No. 1, 2 with the left wing lying along the asphalt round outside the military zone.
- Engines 3, 4 were next to the wreckage.

1.12.3.8 CARGO COMPARTMENT

– Was found in the middle of the main wreckage and the following items were found:
  - Three brake discs (KT-77);
  - Two propeller hubs;
  - Two heat exchangers;
  - One wheel assembly (KT-77).

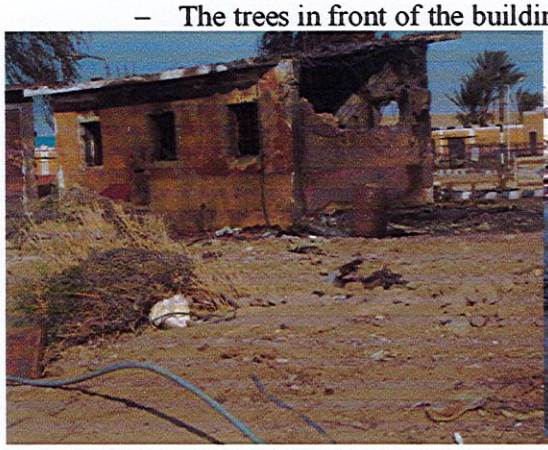
other than the traces of wood fire.

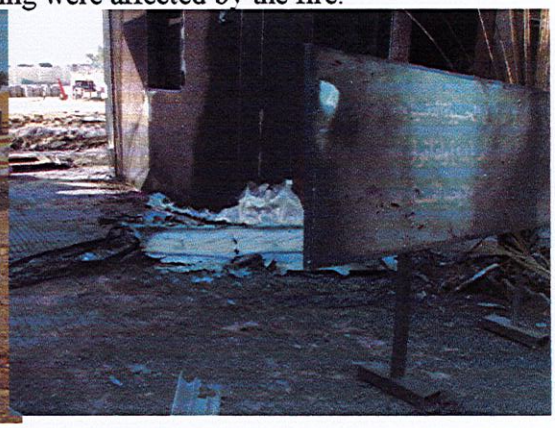
1.12.4 Other Damages

- **First Unit (water buildings)**
  – Have three buildings, separated and close to each other, built with concrete; walls and a ceiling, one floor. The first building has dimensions of: 9.5 x 4.5 and is divided into two partitions. Destruction was found in the south wall from in its upper part till its middle and a part from the ceiling. Also there are carbon contaminations on its walls and the doors and windows and the fire burnt all its components.
  – The second building is 2 meters away from the first from the north side. It has dimensions of 14.5 m x 4.5 m and is divided into two partitions. There are cracks in the building and heavy contaminations

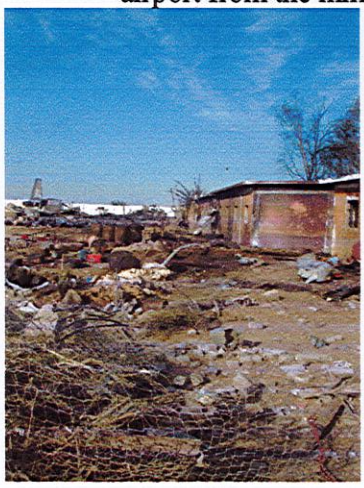
on its walls. The doors and windows were affected with the fire. The fire burned all its components.

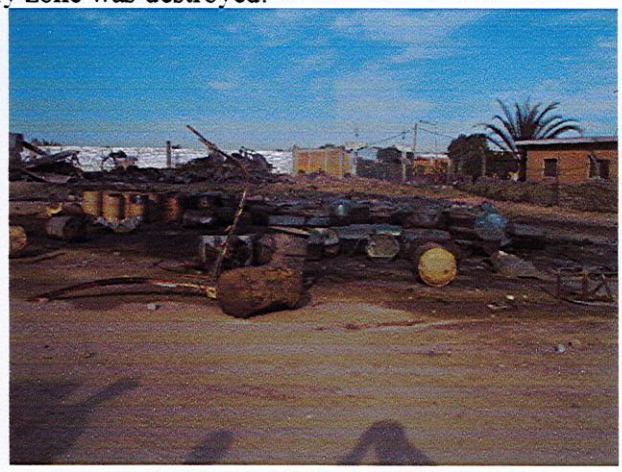
- The third building is next to the second one from the north side and divided into 5 partitions. There are carbon contaminations on its walls from outside.
- The trees in front of the building were affected by the fire.





- **Second Unit (fuel buildings)**
  - Total destruction was detected for the building that was in the aircraft's path.
  - Destruction in a part of the fence on the Tiba-Luxor road and where the aircraft wreckage settled.
  - Several vehicle engine oil barrels were burned.
  - A part of 3 meters long of the airport fence which separates the airport from the military zone was destroyed.





1.13 MEDICAL AND PATHOLOGICAL INFORMATION

- The aircraft crew members all died as a result of the accident:
  1. PILOT IN COMMAND
  2. CO- PILOT.
  3. NAVIGATOR.
  4. FLIGHT ENGINEER.

5. GROUND MECHANIC.

- Autopsy was performed on the 5 bodies of the crew members by the forensic medicine authority and its report concluded the following:
  1. The injuries that were shown and described on the bodies is about fire burns to the coaling level. And there was no sign for any other injuries on the bodies.
  2. Samples of medical tablets, empty ampoules, and 2 bottles containing a liquid and a bottom of a paper bottle found on the wreckage site, were sent to the chemical lab and it was found that these substances does not contain any anti-depression substances or sleeping pills.

1.14 FIRE

- The crash of the right wing into the building belonging to the military base caused fire in all the aircraft except the tail section.

- The fire caused the metal to melt and also parts of the engine and wings.
- Fire was caused due to the crash and the rotation of the engines and the existence of 14 tones of fuel in addition of 2 tons existing in the tanks before refueling.

1.15 SURVIVAL ASPECTS

- The was no chance for the crew survival because of:
  - The aircraft did not stop.
  - The severity of the crash of the aircraft into the building causing it to catch fire destroyed the aircraft and killed all persons on board.

1.16 TESTS AND RESEARCH

1.16.1 Tests Performed on Engines

- **According to Moldavia CAA:**
  - The logged numbers of the engines are the numbers on the FLANGE connecting the Combustion Case and Compressor Flange.
  -

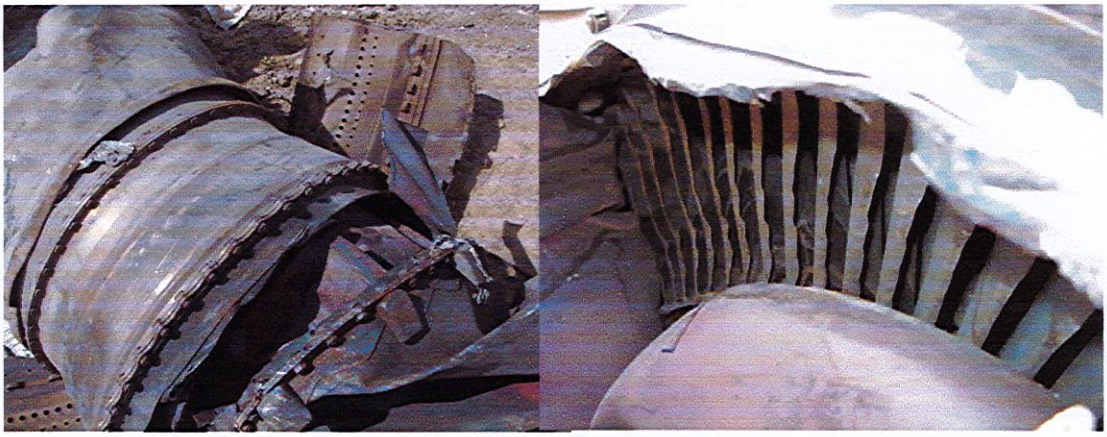
NO.OF ENGINE	SEVERAL NUMBER	HIGHER THAN	LOWER THAN
1	466201503820	2446060	UNCLEAR
2	74527516049	28 (UNCLEAR) 55	2126020
3	697201503820	-	-
4	375201003820	UNCLEAR	1 K 2525189

Engine No.1

- The number on the engine matches the data at the Moldavian CAA.

- The inspection showed that the compressor blade had no damage.

- The inspection of the turbine blades through the nozzle case showed that the last turbine stage is damaged due to the collision.

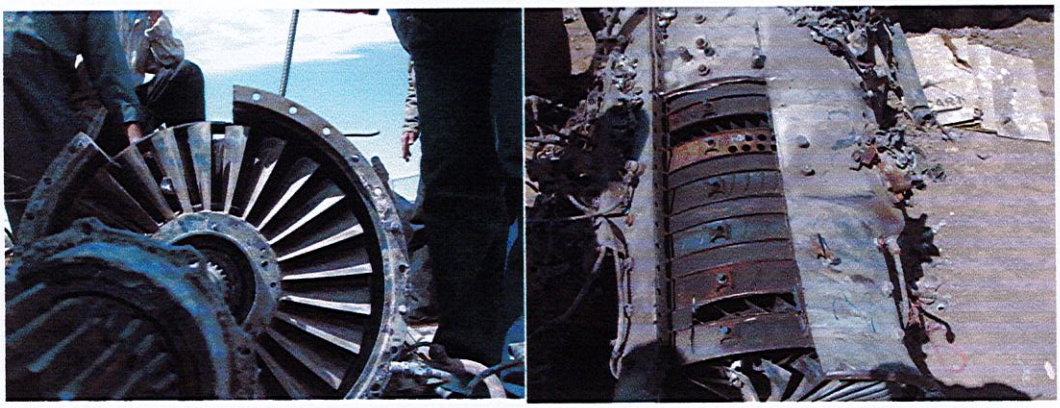


Engine No.2

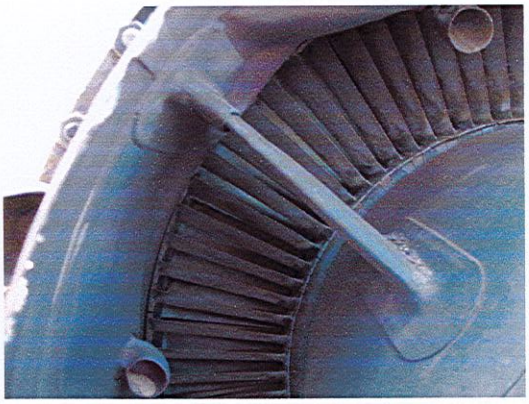
- The number on the engine matches the data at the Moldavian CAA.

- But there are numbers that were reprinted.

- The blades were sound but starting from the fifth stage there was a layer of soot which indicates that the engine was in surge.



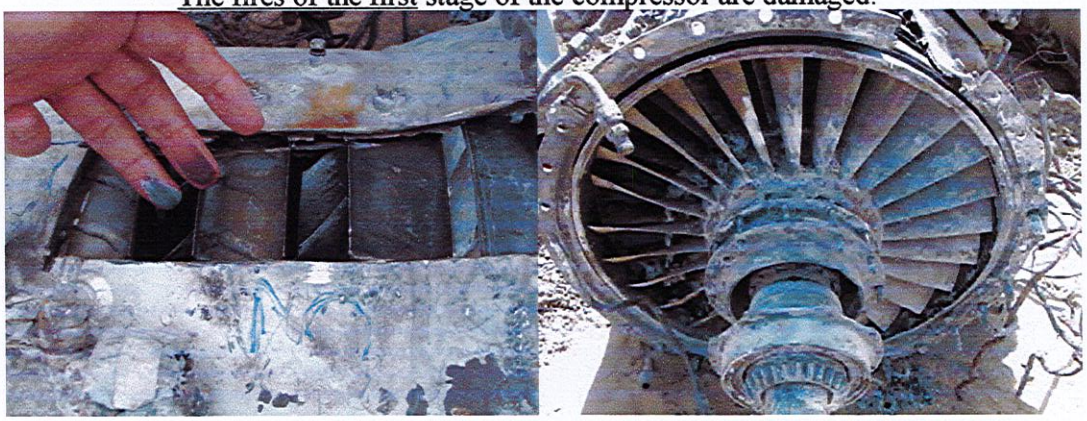
- The inspection of the turbine blades through the nozzle case shows no damage in the last stage of the turbine.



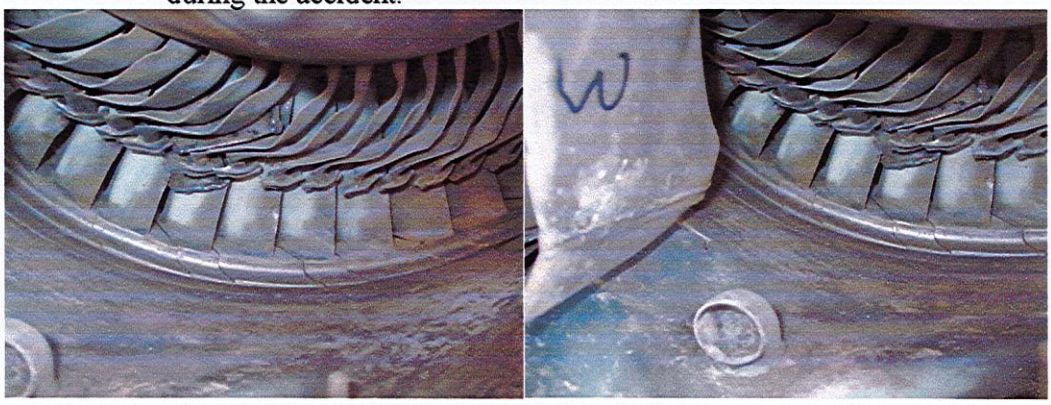
Engine No.3

- The number on the engine matches the data at the Moldavian CAA.

- The fires of the first stage of the compressor are damaged.



- The last stage of the turbine blades are substantially deformed and bent in the direction opposite to the rotation.
- The nature of the deformation shows that the engine was running during the accident.

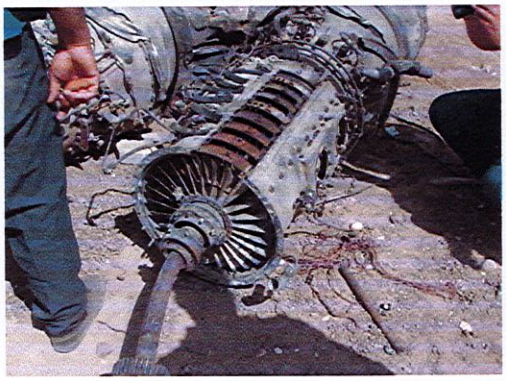


Engine No.4

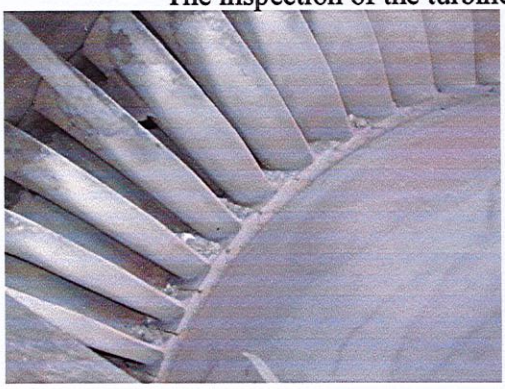
- There were several numbers on the engine:
  - Г 375 201003820

  - 1К 2525189

  - None clear number.
  - 2545065
- The compressor blades are in normal state and fixed.
- There was a layer of soot on the blades of the second stage which indicates that the engine was not running during the accident.




– The inspection of the turbine blades showed no damage.




Propellers Investigation

- According to Moldavia CAA, the numbers of the propellers printed on it are as follows:

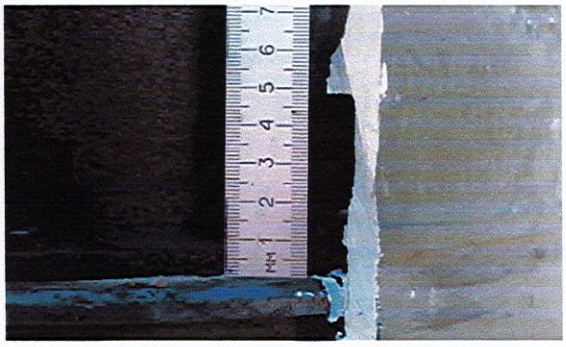
NO.	PROPERLLER HUB NO.	SYLINDER NUT NO.	COUPLING NO.
1	N41019731	N41019731	N41019731
2	N102260596	N102280596	N102260596
3	N128240634	N128240634	N128240634
4	N031270120	N031270120	N121270677

- The investigations performed on the propellers and engines wreckage show that they were destroyed all in the fire.
- For the units influencing the engine and operation of the propellers (RPM controller R-68, MEC KTS-5, feathering pumps), they were in a partial destruction state and separated from the engines.

Propeller No.1

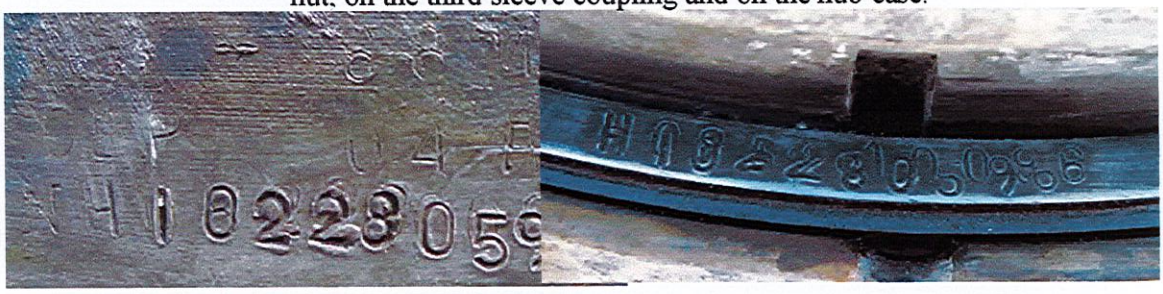
– Serial numbers:
  - Number on the propeller hub N 41019731
  - Number on the cylinder nut N 41019731
  - Number on the coupling N 41019731

- The propeller was in the highest temperature area which caused the blades to melt and Blades, the cylinder had a hole with irregular shape 15 to 17 squared centimeters in the radial part which caused the cylinder case to melt and the butts to separate leaving the propeller in a "rotating freely" state and because of the failures in the cylinder, there was no oil in it.
- And by the assembly of the propeller, it was clear that:
    - The piston stroke is 49 mm.
    - The slotted protrusion of the mechanic stop is 31 mm.
- And it was clear that the propeller was in the operation mode.

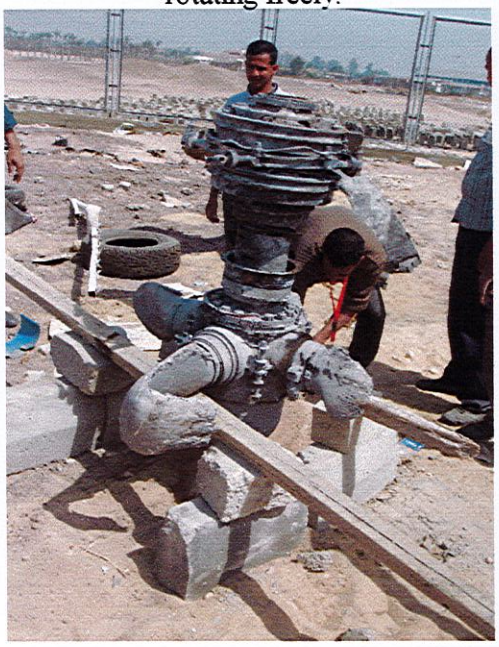


Propeller No.2

- Serial numbers:
  - Number on the hub N 102280596
  - Number on the cylinder nut N 102280596
  - Number on the coupling N 102280596 (sleeve 1)
  - There was evidence of number reprinting on the cylinder nut, on the third sleeve coupling and on the hub case.

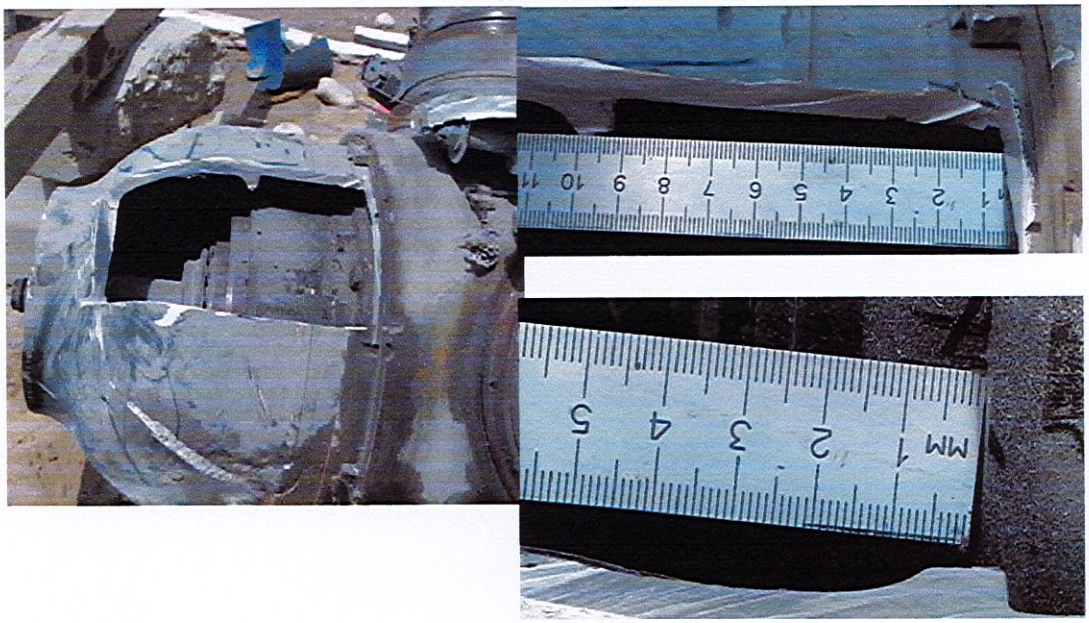


- The propeller was in the fire area, in a melting state and the cylinder had a crack along the perimeter; 50 mm length and 2mm width in the lower part. Also one rod was ripped off and the blades butts were rotating freely.



- And because of the failures in the cylinder; there was no oil in it.
- Three butts of the blades were in feathering position and lost all sealing and dust caps, rubber washers, and coarse pitch hollow.

- And by the assembly of the propeller, it was clear that:
  - The piston stroke is 93 mm.
  - The slotted protrusion of the mechanic stop is 16 mm.
- And it was clear that the propeller was in the non-operating mode.



Propeller No.3

- Serial numbers:
  - Number on the hub N 128240634
  - Number on the cylinder nut N 128240634
  - Number on the coupling N 128240634 (sleeve 3)
  - It is suspected that the first figure «4» was reprinted

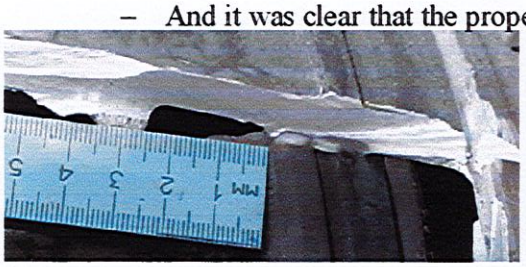
- The propeller was in the lower temperature area and all the blades had mechanical and thermal deformation along the blades and also the connecting rods were ripped off and the blades were rotating freely.

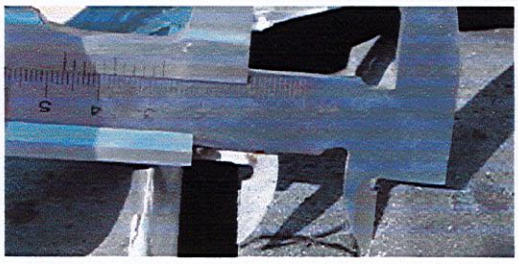
The cylinder had no external failure. The main lock and the insulator in relief fitting

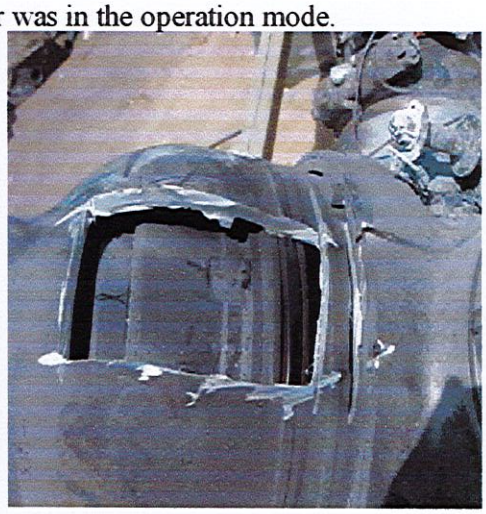
were missing. There were 3600 cubic centimeters of oil in the cylinder.

– And by the assembly of the propeller, it was clear that:
  - The piston stroke is 25 mm.
  - The slotted protrusion of the mechanic stop is 28 mm.

– And it was clear that the propeller was in the operation mode.







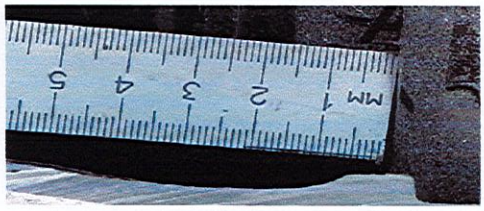
Propeller No.4

– Serial numbers:
  - Number on the hub N 031270120
  - Number on the cylinder nut N 031270120
  - Coupling band (sleeve 4) N 031270120
  - Number on the coupling N 121270677 (sleeves 1, 3)

- The propeller was in the fire area and the blades melted.
- The cylinder had thermal deformation in the lower part and also the connecting rods were ripped off and the blades but were rotating freely.

- There was no oil in the cylinder.

- And by the assembly of the propeller, it was clear that:
  - The piston strokes are 4 mm.
  - The slotted protrusion of the mechanic stop is 16 mm.
- And it was clear that the propeller was in the ground idle mode.

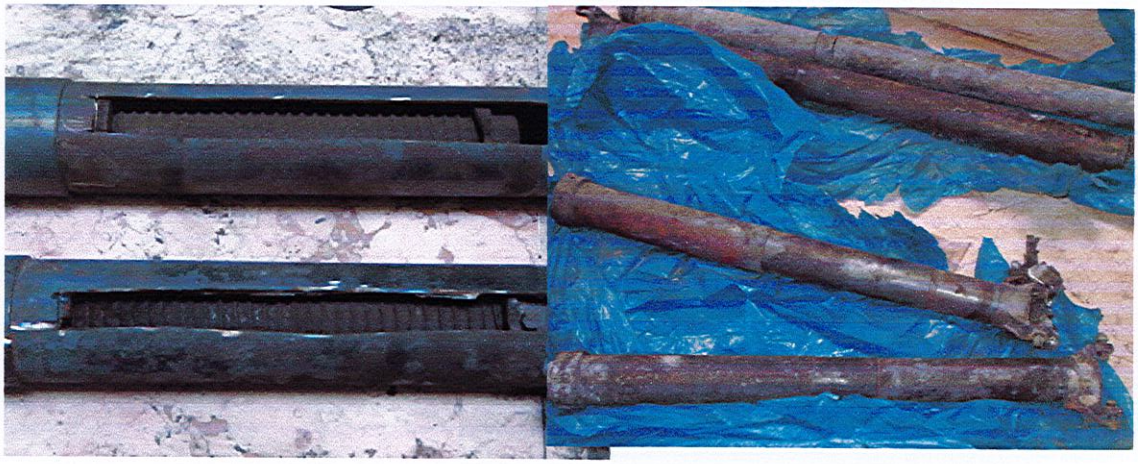


1.16.2 Conclusion of Propeller investigation

- _Propeller №1 (N 41019731) was at the intermediate stop and in the operating mode;
- Propeller №2 (N 102280596) was not at the intermediate stop and was feathered in the non operating mode;
- Propeller №3 (N 128240634) was at the intermediate stop and in the operating mode;
- Propeller №4 (N 031270120) was not at the intermediate stop and was in the ground idle mode.
- The detailed examination of the propeller revealed that the numbers printed were different from the numbers provided by the Moldovan CAA which refer to 2008.
- Only one propeller serial number (H 12840634) was consistent with the given data (No.3).
- The following violations during propeller operations are to be mentioned:
  - unauthorized reprinting of the propeller numbers;
  - inconsistence of the numbers on the couplings and hubs;
  - –missing locks and sealing on the cylinder relief fitting (propeller № N 12824063

1.16.3 Tests Performed on FLAPS JACKSCREW

- The main columns of the flaps jackscrew were tested by measuring the distance of the flaps track (left and right) and comparing it by the flap track design and assembly tolerances and it was found that the flaps were on the 25 degrees position.



1.17 ORGANIZATIONAL AND MANAGEMENT INFORMATION

- None

1.18 ADDITIONAL INFORMATION

1-18-1 FLIGHT DETAILS

- According to the information from the Moldavian CAA, the aircraft crew made a ferry flight from Entebbe airport – Uganda to Luxor Airport and landed at 2230 UTC in a 6 hours flight and about 8 hours working hours as they did not take enough rest hours before they make their flight to Luxor. They had rest at Entebbe airport, amount of the rest time could not be established.
- The aircraft took off from Luxor airport at 0218 UTC and that mean that the working hours before departing from Luxor airport were about 11 hours and 48 minutes (it is supposed that the crew takes at least 12 hours rest after working the 11 hours 48 minutes.)
- The departure from Luxor airport to Nikolaev was a violation to the duty and flight hours standards.

1-18-2 LAST ENGINES TEST

- The four engines tests were performed in 15/2/2009 by pilot\ Yury Berdiev on Idle power, minimum power and maximum power. The results were as follows

:

	IDDLC				MINIMUM POWER				MAXIMUM POWER			
RPM	#1	#2	#3	#4	#1	#2	#3	#4	#1	#2	#3	#4
FUEL PRESSURE	4	4	5	4	25	26	25	25	65	65	65	65
OIL PRESSURE	5.5	5.5	5.4	5.5	5.5	5.5	5.4	5.5	5.5	5.5	5.5	5.5
TORQUE	-	-	-	-	-	-	-	-	-	-	-	-
EGT	300	300	300	300	320	310	320	310	510	490	500	510
OIL TEMP	30	30	30	30	70	70	70	70	85	75	80	80
FUEL FLOW	-	-	-	-	600	550	600	550	1050	1000	1050	1000

1-18-3 PREPARATION OF THE FLIGHT

- Preparation works was performed to obtain the aircraft airworthiness certificate for a ferry flight to Nikolaev airport, Ukraine and to extend the airworthiness period, this work is according to the list of works on AN12B and was performed by flight engineer as executive and technician as supervisor. The work began in 20/11/2008 and ended in 20/1/2009 and there was no remarks noted and the aircraft was found airworthy.

1-18-4 The states contributing to the accident Investigation

- Several states were contributing in the accident investigation process as follows:

- The State of Manufacturer – Ukrainian National Civil Aviation Administration (NCAA) and a technical crew were sent to investigate the aircraft wreckage (structure, engine, and propellers).
- State of Victims, air accident investigation commission, as three of the victims were Russians and an accredited repetitive was assigned and he supplied the information about the aircraft from Moldavian CAA and also the aircraft manufacturer regarding the accident.
- The State of Operation, South Africa, (South African Civil Aviation Authority) and the available data about the aircraft was sent by its owner.
- The State of Registration, Sao Tome, Civil Aviation National Institute (INAC).
- The Democratic Republic of Congo (Direction De L Aeronautique Civile Ministere Des Transports et Communications) and there were no response about an accident the aircraft had in Kisanhani airport in Congo in 1/11/2007 but there was no reply.
- Uganda, Directorate of Civil Aviation Authority, and there were no response about the arrival and departure of the aircraft and any notice about the aircraft or its crew (as the last station for the aircraft before Luxor was Entebbe – Uganda.

- The draft report sent on 18/10/2010 to the accredit representative of Russian Federation (MAK) in accordance with Annex 13.Hehad No comments to the draft report.

1.19 USEFUL OR EFFECTIVE INVESTIGATION TECH

- N/A.

2 ANALYSIS

2.1 Take off rolling facts:

- According to the ATC of Luxor Airport the takeoff roll started from the threshold of runway 02.
- The takeoff roll was aligned with the runway centerline;
- The end of runway 02 has traces of the main landing gear wheels braking, about 60 m long;
- The total length of the roll was about 3500 m (3000 m on the runway and 500 m on the ground until the impact on the first obstacles);
- After the overrun the aircraft basically moved with the nose gear up, gradually deviating to the right from the runway centerline, the main landing gear did not lift off;
- There was no tail strike on the runway or the ground;
- The mathematical match made by the Antonov Design Bureau revealed the lack of available thrust (consistent with just two engines operating).
- There were no aircraft fragments on the ground before the place of the first impact.

2.2 At the time of the impact facts:

- The flaps were set at 25 degree.

- The elevators were in the max pitch-up position;
- Engines 1 and 3 were operative and in the operating mode, their respective propellers were at intermediate stops;
- Engine 2, most probably, was not running (the propeller was feathered);
- Engine 4 was most probably not operating; its propeller was not at the stop and was in the ground idle mode.
- At Luxor Airport the aircraft was refueled with 19000 liters of fuel. The calculations showed that the takeoff weight of the aircraft was 57-60 tons; the center of gravity was approximately 18-20%.
- The takeoff was made from RWY-02 with the course of 23 degree. The length of runway -02 at Luxor airport is 3000 m and the airport elevation is +294 ft. The aircraft took off at 0218 hrs UTC (0418 hrs local time) in the following weather conditions: wind 170 degree , 1 m/sec speed, visibility 10 km, QNH 1014 hPa, , temperature +14 degrees., moisture content 47%.

2.3 The available information revealed the following:

1- After getting the ATC clearance the crew started the flight. The takeoff roll was probably made with three engines running, and Engine 2 was shut down with the propeller feathered. According to the ATC recorder information, there were no complaints on the part of the crew about any faults or failures.

Note: The FCOM of An-12 has a section concerning conducting ferry flights with one engine inoperative. This section deals with emergency situations and cannot be applied in normal operations. According to the FCOM, it is only allowed to take off with one engine inoperative if the following limitations are complied with:

-The takeoff weight must not exceed 52 tons;

-The outside air temperature must not exceed 25^0C;

-There must be no crosswind from the right if Engine #3 or 4 is inoperative; in all other case the crosswind speed must not exceed 5 m/sec;

-The RWY must be dry;

-The runway length must not be less than 2100 m if an inboard engine is inoperative and not less than 2300 m if an outboard engine is inoperative;

-The obstacle-free clear takeoff area must be not shorter than half the length of the runway counting from the end of the runway;

-The takeoff must be made in daytime with the cloud ceiling not lower than 200 m and visibility not less than 2000 m;

-There must be no actual or forecast icing conditions on the flight route;

-the PIC must have performed training flights for rejected and extended takeoffs.

2-Besides, when the aircraft is prepared for a ferry flight, special

attention must be paid to providing operability of the other engines, and landing gear units. The flight is performed only with the feathered propeller of the inoperative engine. The runway is marked with two additional markers. One of them is set 1050 m away from the start point if an inboard engine is inoperative and 1150 m away if an outboard engine is inoperative. The second marker is set 1800 m away if the inboard engine is inoperative and 1950 m away if the outboard engine is inoperative.

3- According to the records exchange the ATC clearance for startup was given at 0204 hrs, and after taxiing to runway-02 the takeoff was initiated at 0218 hrs.

According to the An-12 FCOM in the actual conditions the takeoff should have been performed with Flaps 15. As the analysis showed, at the time of the impact the flaps were set at 25

The lack of rolling during the takeoff means that the crew was reaching the engines operating mode in compliance with the FCOM recommendations.

Note: The aircraft took off with the engines working synchronically in the takeoff mode. The mode control of the engine symmetrical to the inoperative one is maintained in the following manner:
- If an inboard engine is inoperative the throttles of the symmetrical engine before the aircraft starts moving are to be set at 50° and not changed until reaching a speed of 100 km/h. At that speed the throttle is smoothly (within 2-3 seconds) increased up to 70-80° and at a speed of 130 km/h it is advanced up to the takeoff mode (An-12 FCOM).

It can be supposed that at the initial stage of the takeoff roll the crew managed to maintain the required parameters in compliance with the FCOM and they decided to continue the takeoff.

Note: The following parameters are recommended as standard for the normal takeoff roll with three engines:

-When the aircraft is approaching the first marker (1050m away from the start point) all the engines should be in the takeoff mode;

-The speed should reach 170-180 km/h;

-The effectiveness of the directional control should be sufficient to keep the aircraft on the runway centerline.

If on reaching the first marker the signified values have deviated significantly, the takeoff should be rejected (An-12 FCOM).

Thus, it is most probable that at a distance of 1050-1200 m from the start point Engines 1, 3 and 4 were set to the takeoff mode, the directional control was sufficient to keep the aircraft on the runway centerline, and the crew decided to continue the takeoff. According to the An-12 FCOM the length of the takeoff roll with an inboard engine inoperative is 1760 m for standard conditions.

4- The analysis of the available information showed that by the time

the aircraft veered off the runway, the nose gear was up but the main gear did not lift off. The length of the roll was about 3000 m. According to the findings of the mathematical match made by the Antonov Design Bureau, it is possible that the speed of the aircraft at that time did not exceed 150-170 km/h (depending on the aircraft weight and center of gravity). This can happen if during the takeoff two engines are not running and the other two do not reach the full takeoff power. The findings of the mathematical match confirm lack of available thrust, which corresponds with power from two engines.

Thus, it is most possible that after the crew decided to continue the takeoff, engine 4 shut down but its propeller was not feathered automatically.

> Note: If during the extended takeoff with one engine inoperative there are signs of another engine failure and the automatic feathering did not happen, the propeller of this engine must not be feathered (An-12 FCOM, para 5.4).

After the signs of Engine 4 failure the crew most probably deactivated the stop on the propeller, reduced the engine rpm and continued the takeoff. This decision was incorrect, as having the takeoff weight of 57-60 tons with two engines inoperative the liftoff could not be made within the runway. The failure of Engine 4 is confirmed by the aircraft deviation to the right, as when the propeller is not feathered and the engine is on ground idle it leads to a significant braking moment which turns the aircraft into the direction of the failing engine.

5- As there were no recorded information about the accident flight on the flight recorders, it is impossible to determine the crew actions in the developing emergency situations. It should be mentioned that the crew was imposed to fatigue and the landing at Luxor was at 2230 hrs on 19 February, 2009. The flight duration from Entebbe (Uganda) to Luxor was about 6 hours and before taking off from Luxor at 0218 hrs the crew did not have enough time for rest. The decision of the crew to fly was influenced by the fact that the temporary certificate of airworthiness expired on 20 February, 2009

6- Another contributing factor to the accident was the uncoordinated crew actions in the critical situation (both pilots had previously flown as captains). The lack of coordination is confirmed by the braking trails left by the main landing gear at the end of RWY-02, as according to the FCOM in case of rejected takeoff attempt the crew was to set the throttles to idle, put the nose gear on the runway and then use the propellers for braking (releasing them from the stops). Also, to reduce the roll and to maintain the direction they were to use the nose wheel steering and wheel brakes as well as emergency braking if needed. Actually the crew did neither of these procedures except using the main wheel brakes.

After running through the entire length of the runway the aircraft continued moving on the ground with the nose gear lifted for another 500 m, gradually veering off to the right, collided with the obstacles, was severely damaged

and almost totally burned

3 FINDINGS

3.1 THE AIRCRAFT

- The last registration for the aircraft was in Moldavia state with the registration marks ER-AXI and ended in 27/2/2008.
- A C.O.A. was issued for it from the Moldavian CAA; the last was with the number MA-1552 and expired in 21/4/2007 before it was registered in SAO TOME to the purpose of performing the accident flight.

- The aircraft was owned by AERIANTOR-M company in Moldavia state which ended its business in 16/1/2007 and after that it was sold to Mr. /Victor Zelinyok.
- The aircraft was temporarily registered in Sao Tome state in 21/1/2009 and valid till 20/2/2009 (the accident day) with registration marks: S9-SVN.
- The aircraft was holding temporary ferry flight special flight permit valid till 20/2/2009 from Kinzangani airport, Congo to Nikolaev, Ukraine.
- The permission and the registration were for Aero Lift Company Limited.
- The aircraft was holding an insurance certificate issued in 12/2/2009 and valid till 12/2/2009 for a ferry flight from Entebbe – Uganda to Kiev, Ukraine through Luxor airport in 2 flights (2 take offs and two departures) including the third party.
- The aircraft was damaged and destroyed as a result of the accident.
- On board of the aircraft and in cargo compartment there were spare parts and traces of burnt wood but its weight was indeterminate
- The aircraft and the engines did not have sufficient service life for the flight.
- The aircraft and engine preparation for the determination of the possibility of extending service life for the ferry flight was not complete
- The CAA of San Tome and Principe issued the certificate of airworthiness without any analysis of the technical conditions or documentation on service life (in flight hours and calendar days) of the aircraft and engines. The issuance of the temporary certificate of airworthiness was not coordinated with the aircraft designer (Antonov Design Bureau) and engine designer (Ivchenko-Progress State Enterprise).
- The engines and propellers mounted on the aircraft had reprinted numbers. There is no documentation confirming their service life or airworthiness.
- In violation of the flight operation, rules the engines on the aircraft were of different types (AI-20M and AI-20K).
- . In violation of the recommendations of ICAO Annex 8 B Section 4 para.4.2.2, 4.3.1, 4.3.3, 4.3.4, 4.3.5, 4.3.6, 4.3.7, there is no coordination when solving the issues of continuing airworthiness

and issuance of Certificates of airworthiness between the State of Registry and the State of Design.

3.2 THE CREW

- All the aircraft crew members (5) died as a result of the accident.
- The available information about the crew members is few but they had long experience.
- There are no data about the qualifications and experience of the pilot as a pilot or a co-pilot as stated by the Russian IAC contributing in the accident investigation as an accredit representative for state of Russia.
- The pilot was holding a valid airline pilot license and had an overall experience of 20,000 flying hours.
- The co-pilot was holding an airline pilot license and also a medical certificate valid till 6/11/2009.
- The experience of the co-pilot on the type is 6397 hours half of which (2084) are night flights.
- The navigator was holding a valid navigator license and had an overall experience of 20,000 hours.
- The flight engineer was holding a valid license and had a general overall experience of 16,000 hours.
- The crew did not have enough time for rest. The decision of the crew to fly was influenced by the fact that the temporary certificate of airworthiness expired on 20 February, 2009
- The flight was performed by a mixed crew, not all the data concerning the professional training of the PIC, Flight Engineer and Navigator were provided by the aircraft owner. It was impossible to assess the level and quality of the general professional level or the readiness of the crew for the accident flight.
- The crew was hired to perform the ferry flight to Ukraine only

3.3 THE ACCIDENT

- The aircraft kept rolling on all the runway (3000 meters) and the tracks of its wheels on the sand extended till it crossed the fence of the airport and collided in the military buildings and its wheels did not leave the ground and did not lift off.
- The aircraft had 16 tons of fuel onboard enough for 8 flying hours which is a huge amount of fuel that contributed in the aircraft destruction after it caught fire.
- It was not possible to determine the flight rest hours which the crew had in Entebbe airport, Uganda. The flight Entebbe/Luxor took 6 flying hours which corresponds 8 duty hours.
- The aircraft landed in Luxor airport at 2230 UTC in 19/2/2009 and started its flight from Luxor airport at 0210 in 20/2/2009, and by that the duty time of the crew before the accident had been 11 hours and 40 minutes.
- According to the Russian and Moldavian CAA, it is obligatory for the crew to have 12 hours rest (Russian IAC data).
- The flight from Luxor to Nikolaev was supposed to take 5 and half hours.

- From the previously mentioned its clear that the total duty hours of the flight would reach 17 hours which makes it against the domestic and global civil aviation regulations.
- The aircraft kept on ground in Luxor airport for 3 hours during which the crew refueled the aircraft, supplied the aircraft with food, and checked the aircraft.
- The crew serviced the aircraft and demanded door steps and chocks only from EgyptAir For Maintenance and Engineering company that was handling the aircraft.
- The crew started the aircraft engines while none of the handling company personnel was present.
- No available witnesses to advice about the number of engines which were running before rolling for the take off from Luxor airport.
- The purpose of the flight was to perform a ferry flight to deliver the aircraft to the military maintenance base in NIKOLAEV, Ukraine.
- The examination of the flight recorders information from the An-12B S9-SVN revealed that there were no records of the accident flight on the FDR or the CVR
- According to the An-12 FCOM in the actual conditions the takeoff should have been performed with Flaps 15. At the time of the impact the flaps were set at 25°.
- According to the An-12 FCOM the length of the takeoff roll with an inboard engine inoperative is 1760 m for standard conditions

4 PROPABLE CAUSES OF THE ACCIDENT

- Lack of available thrust which corresponded to the power of only two engines running during take off run
- Lack of authorized maintenance of the aircraft.
- The uncoordinated crew actions in the critical situation (both pilots had previously flown as captains). The lack of coordination is confirmed by the braking trails left by the main landing gear at the end of RWY-02, based on FCOM instructions, and in case of rejected takeoff attempt, the crew had to set the throttles to idle, lower the nose gear to reach the runway and then use the propellers for braking (releasing them from the stops). Also, to reduce the roll and to maintain the direction they were to use the nose wheel steering and wheel brakes as well as emergency braking if needed. Actually the crew did neither of the above procedures, except using the main wheel brakes.

5 SAFETY RECOMMENDATIONS

- It is recommended that Aviation Administrations of the States:

5-1 Pay attention to compliance with the ICAO recommendations in terms of providing and continuing airworthiness of aircraft when including them into state registers and when issuing Certificates of Airworthiness;

5-2 Ensure coordination with the States of Design and Manufacture when taking decisions on the aircraft operations, maintenance and

continuing airworthiness.

5-3 Eliminate issuing temporary certificates of airworthiness for flights after lengthy stays and for aircraft overhauls after damage without coordinating this with the CAA of the State of Design and manufacture;

5-4 State of Registry will consider the operations history of the aircraft , the complete list of technical documents and documents on the airline requiring to include the aircraft into the register;

5-5When considering the flight crew validation documents for the purposes of determination of their validity, ensure coordination with the aviation administrations of the States that issued the respective licenses to the crew.

6 THE INVESTIGATION COMMITTEE

[redacted]

Exhibits:

- Exhibit #1: Aircraft Flight Recorders Read Out Report

Exhibit #1

"Aircraft Flight Recorders Read Out Report"

«Approved»
Chairman of Scientific-Technical Commission

_____V.A. Trusov

«____» _____ 2009 г.

REPORT
on flight recorders research and information decoding

Background *The request of the Ministry of the Civil Aviation of the Arab Republic of Egypt*

Event
Type of event: **accident**
Aircraft type: **An-12B**
Registration N: **S9-SVN**
Date of occurrence: **20.02.2009**
Place of occurrence: **Luxor Airport (Arab Republic of Egypt)**

Recorders

Recorders types: **MSRP-12 (FDR), MS-61B (CVR)**
Media type: **magnetic tape, metal wire**
Time of entry: **27.04.2009**

FDR: The magnetic tape of the FDR MSRP-12 was delivered on two spools (was recovered from installation place) and another tape on one spool (was found at the accident site). Magnetic tapes are in a good condition (Fig. 1…3). There are no evidences of high temperature influence or mechanical damages. One of two spools has signs "26098 Новая" and "LPM №33631 imf", made by pencil (Fig. 2).

CVR: The metal wire was delivered on two pairs of spools of the CVR MS-61B. The wire is in a good condition (Fig. 4…5). There are no evidences of high temperature influence. The first pair of spools: there was practically no any metal wire on the feeding spool; feeding spool has sign "003" and serial number 8779204. The receiving spool wire amount was 0.75 (scale: «0»÷«1»), the receiving spool has serial number 9371414 (Fig. 5). The second pair of spools (from stand by recorder): The feeding spool wire amount was 0.85 (scale: «0»÷«1»); the feeding spool has sign "ЯК", serial number 9231673 and marking "ХБР N73". The feeding spool wire amount was 0.15 (scale: «0»÷«1»); the feeding spool has serial number 913xxxx (four numbers unreadable) and marking "ХОЛО N70" (Fig. 4).

Recorder's media recovering

FDR MSRP-12: not conducted.
CVR MS-61B: not conducted.

Information recovering and decoding

FDR MSRP-12. The FDR MSRP-12 information readout was conducted in a presence of representatives of the Ministry of Civil Aviation of the Arab Republic of Egypt, Antonov Design Bureau and "Motor Sich" Design Bureau in the laboratory of the IAC. The calibrations, which were found at the accident site, were used for decoding information (Fig. 6...17). The system MSRP-12 is not designed to record service information, so it is not possible to determine the date of the last recorded information.

The following was found during the readout:

About magnetic type recovered from installation place:
- the record is of a good quality;
- the list of parameters recorded by system MSRP-12 corresponds to the actual list of aircraft An-12 (see Registered parameters list);
- the total duration of the record is approximately 1 hours 15 minutes (Fig. 18);
- during all record there is no information about take off of the aircraft;
- the system MSRP-12 recorded information about level flight, approach and landing;
- according to the record the landing was normal, without any failures;
- according airport elevation (about 900 meters), the landing was not in Luxor airport (it's elevation is about 100 meters);
- the information analysis showed, that the magnetic tape of the system MSRP-12 recovered from installation place contained no information about the accident.

About magnetic type found at the accident site:
- the record is of a good quality;
- the list of recorded parameters corresponds to the actual list of aircraft An-12;
- the total duration of the record is approximately 2 hours 09 minutes (Fig.20);
- the system MSRP-12 recorded information about climb, level flight, approach and landing;
- according to the record there were no failures;
- the information analysis showed, that the magnetic tape of the system MSRP-12, found at the accident site, contained information about one of the previous flights of the aircraft An-12.

Results of the information decoding presented at Fig. 18...20.

CVR MS-61B. Copying, decoding, audition and analysis of acoustic information was made with P-504N and a special program Sapfir 3.2. The quality of copied information is satisfactory.

The results of the audition are:

- The duration of the information from the main tape recorder receiving spool is 5 hours 07 minutes, duration of the information from stand by tape-recorder receiving spool is 1 hour 29 minutes.
- The main tape recorder receiving spool contains information of the tape-recorder technical check that was performed in «Volga-Dnepr» laboratory and crew conversations during the flight from airport Shardja to Djibouti with mentioning the transit points KILIT, DAKET and MASKAT and crew conversations during the flight from SALAL to Djibouti with mentioning the transit points KABIT, REJAVA and ADIS-ABEBA. Also there was mentioned the aircraft registration mark ER-AXI. The duration of the record with crew conversations during the flight from airport Shardja to Djibouti is 2 hours 55 minutes. The duration of the record with crew conversations during the flight from SALAL to Djibouti is 1 hour 57 minutes.
- The stand-by tape recorder receiving spool contains information of tape-recorder technical checks dated 19 March 2007 and 20 March 2007 in the «Volga-Dnepr» laboratory and crew conversations during landing in Djibouti with mentioning transit point TORBA and during take-off from Djibouti with mentioning transit points LAGBI and MABUTU. The duration of the record with crew conversations during landing in Djibouti is 58 minutes. The duration of the record with crew conversations during take off from Djibouti is 23 minutes.
- Crew conversation analysis showed that there was no information about the accident flight with An-12 S9-SVN on 20 February 2009 on the main and stand-by tape recorder receiving spools. The data copied is presented.

CONCLUSION

The magnetic tapes from FDR MSRP-12 and the metal wire from CVR MS-61B contain no information about the accident.

From the INTERSTATE AVIATION COMMITTEE	**From the Ministry of Civil aviation of the Arab Republic of Egypt**
Popov Y.V.	Gebaly Hussein El-Dessoky Salama
Kuznetsov A.N.	Emad Daowd Nashed Gindey
Krasotkina I.A.	Reda Ibrahim Mahmoud El-Bllat

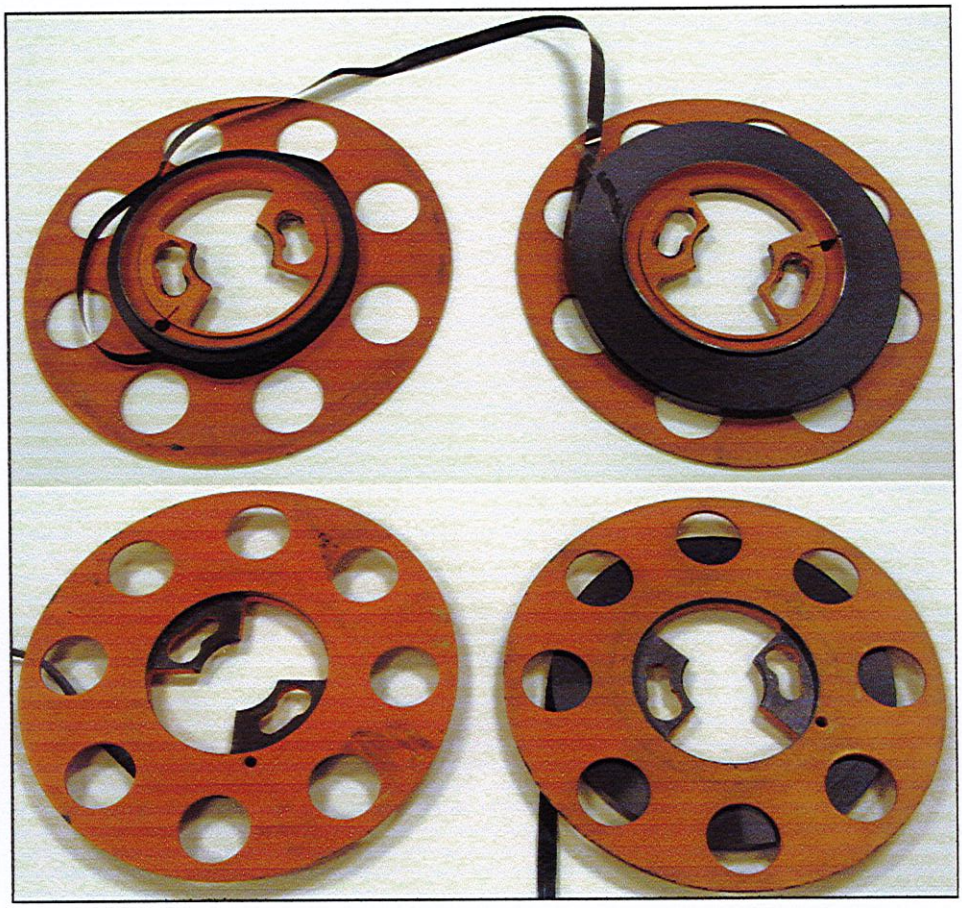


Fig. 1.

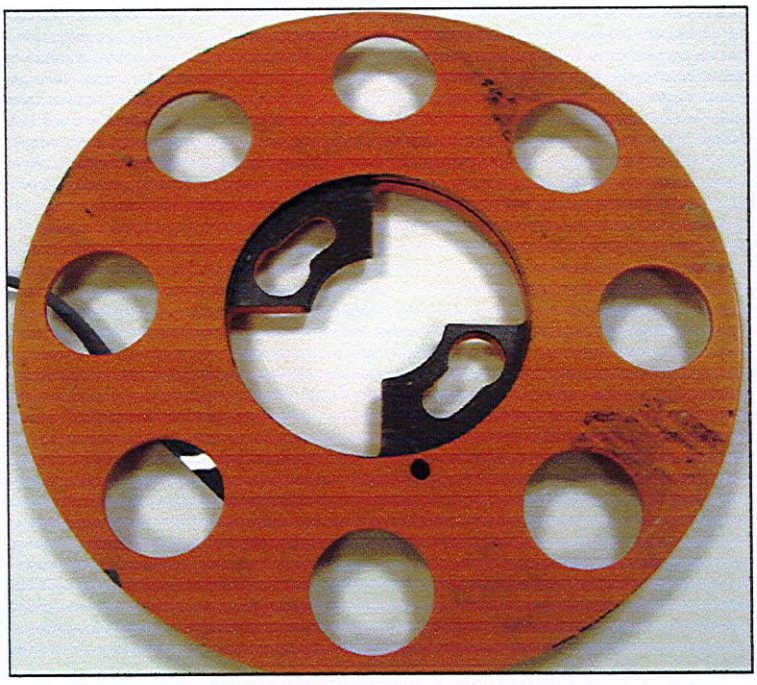


Fig. 2.

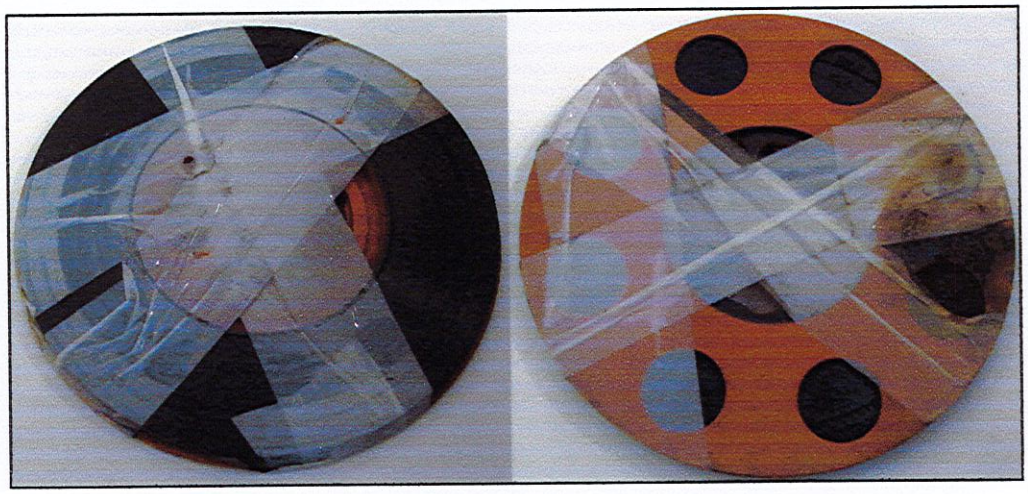


Fig. 3.

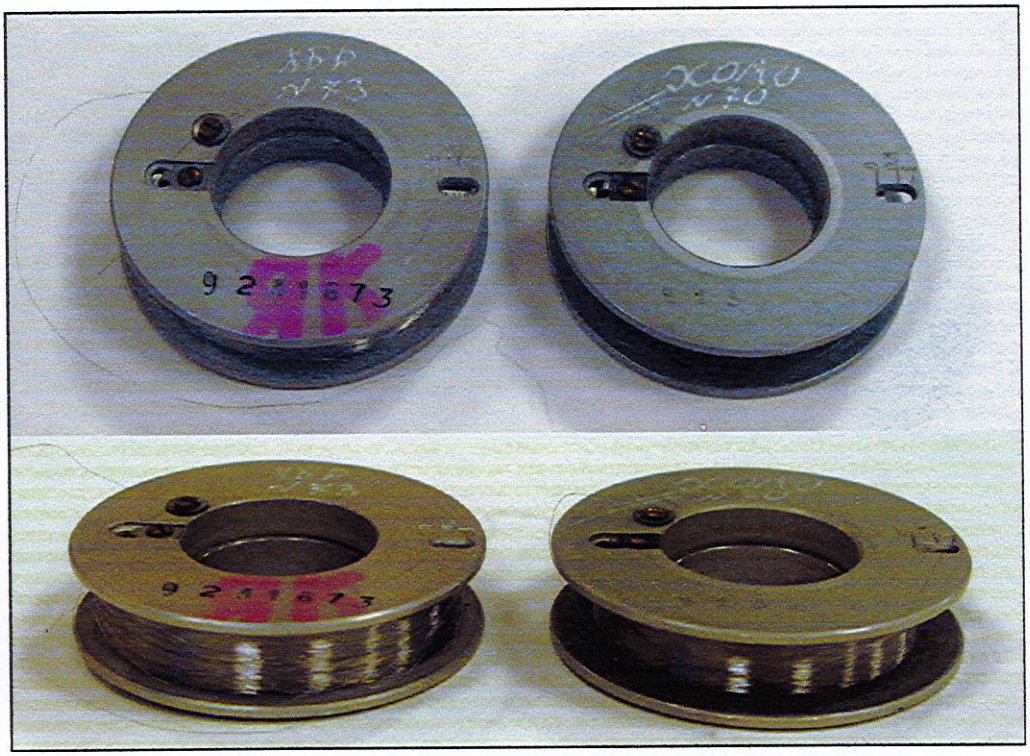


Fig. 4.

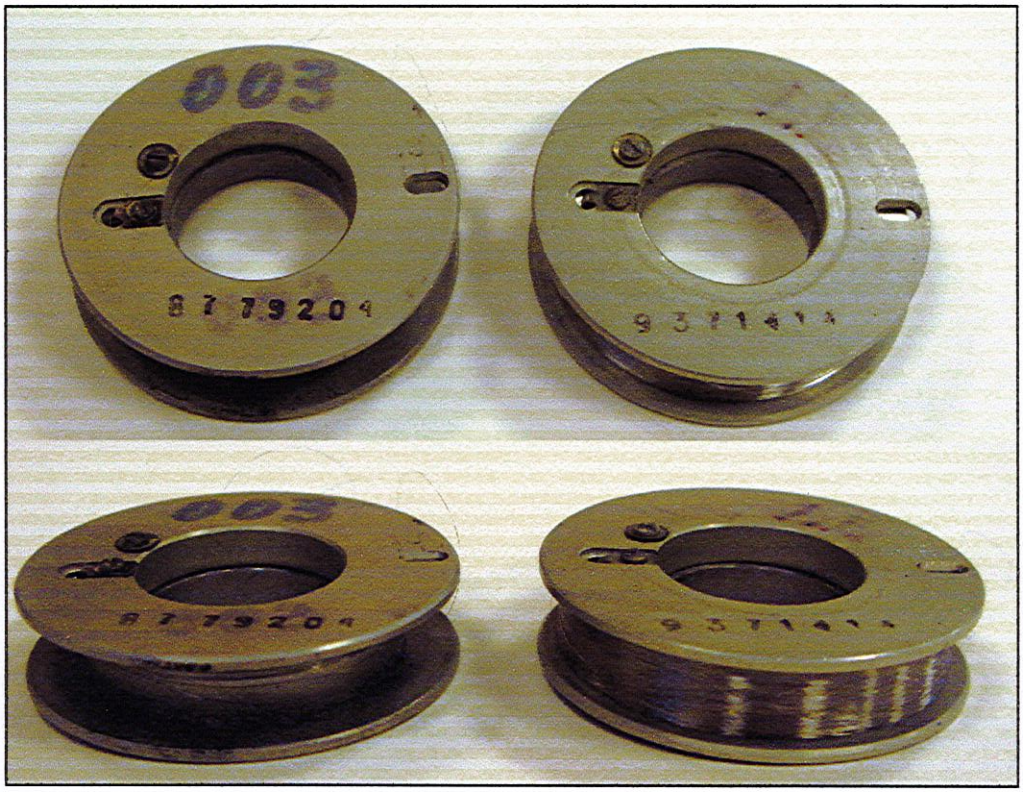
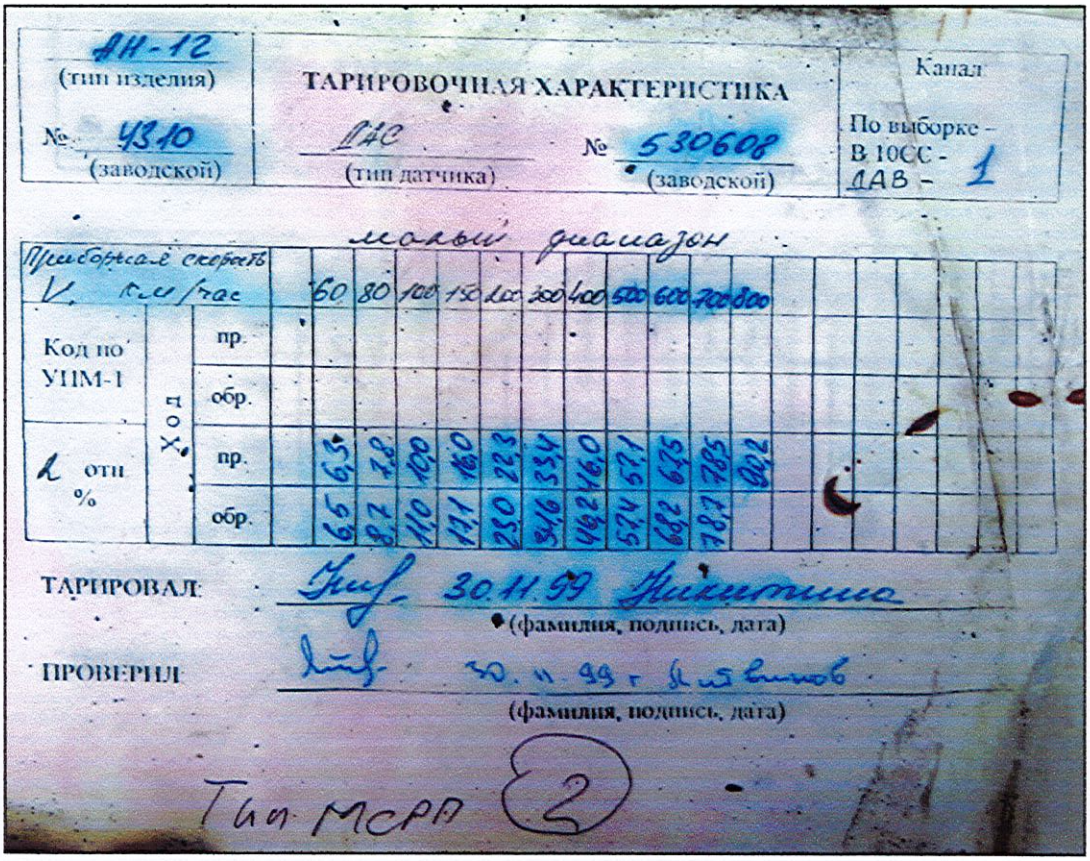


Fig. 5.



ДИ-12 (тип изделия) № 4310 (заводской)

ТАРИРОВОЧНАЯ ХАРАКТЕРИСТИКА

ДАС (тип датчика) № 530608 (заводской)

Канал: По выборке – В 10СС - ДАВ – 1

малый диапазон

Приборная скорость V, км/час			60	80	100	150	200	300	400	500	600	700	800
Код по УПМ-1	Ход	пр.											
		обр.											
k отн. %		пр.	65	78	100	160	223	334	460	571	675	785	902
		обр.	65	87	110	141	230	346	462	574	682	787	

ТАРИРОВАЛ: Инф. 30.11.99 Никитина (фамилия, подпись, дата)

ПРОВЕРИЛ: Инф. 30.11.99 г. Яковлев (фамилия, подпись, дата)

Тип МСРА (2)

Fig. 6.

(тип изделия) № (заводской)

ТАРИРОВОЧНАЯ ХАРАКТЕРИСТИКА

ДВЗП-13 (тип датчика) № (заводской)

Канал: По выборке – В 10СС - 2

Барометрическая высота H, км.			-0,25	0	1	2	3	4	5	6	7	8	9	10	11	12	13
Код по УПМ-1	Ход	пр.															
		обр.															
k отн. %		пр.															
		обр.															

ТАРИРОВАЛ: (фамилия, подпись, дата)

ПРОВЕРИЛ: Инф. Яковлев 30.11.99 г. (фамилия, подпись, дата)

Fig. 7.

(тип изделия) № (заводской)

ТАРИРОВОЧНАЯ ХАРАКТЕРИСТИКА

(тип датчика) № (заводской)

Канал 3

По выборке –

В 10СС -

ЛАВ – 4.

iKM-1

Код по УПМ-1	Ход	
		пр.
		обр.
отн. %		пр.
		обр.

ТАРИРОВАЛ: (фамилия, подпись, дата)

ПРОВЕРИЛ: 30.11.99г (фамилия, подпись, дата)

Fig. 8.

(тип изделия) № 4310 (заводской)

ТАРИРОВОЧНАЯ ХАРАКТЕРИСТИКА

ДМП-400М (тип датчика) № 11518 (заводской)

Канал:

По выборке –

В 10СС -

ЛАВ – 4.

iKM-1

Код по УПМ-1	Ход					
			0	30	60	100
		пр.				
		обр.				
отн. %		пр.	3,2	5,1	27,4	54,9	91,5
		обр.	3,2	27,4	54,9	

ТАРИРОВАЛ: 30.11.99 (фамилия, подпись, дата)

ПРОВЕРИЛ: 30.11.99г (фамилия, подпись, дата)

Fig. 9.


ИКМ-2
(тип изделия)
№
(заводской)
ТАРИРОВОЧНАЯ ХАРАКТЕРИСТИКА
(тип датчика)
№
(заводской)
Канал
По выборке –
В 10СС –
ЛАВ – 5.
ИКМ-2
Код по УИМ-1
Ход
пр.
обр.
пр.
обр.
отн %
ТАРИРОВАЛ
(фамилия, подпись, дата)
ПРОВЕРИЛ
30.11.99г.
(фамилия, подпись, дата)

Fig. 10.


(тип изделия)
№
(заводской)
ТАРИРОВОЧНАЯ ХАРАКТЕРИСТИКА
(тип датчика)
№
(заводской)
Канал
По выборке –
В 10СС –
ЛАВ – 6
ИКМ-3
Код по УИМ-1
Ход
пр.
обр.
пр.
обр.
отн %
ТАРИРОВАЛ
(фамилия, подпись, дата)
ПРОВЕРИЛ
30.11.99г.
(фамилия, подпись, дата)

Fig. 11.

АН-12 (тип изделия)	ТАРИРОВОЧНАЯ ХАРАКТЕРИСТИКА	Канал:
№ 4310 (заводской)	ДМП-100А (тип датчика) № 16006 (заводской)	По выборке – В 10СС - 7. ДАВ –

iКМ-4.

Давление масла, Ркгсм			0	30	60	100
Код по УПМ-1	Ход	пр.				
		обр.				
отн. %		пр.	4.3	29.1	63.1	89.3
		обр.	4.3	28.9	63.0	

ТАРИРОВАЛ: 30.11.99 Никитина (фамилия, подпись, дата)

ПРОВЕРИЛ: 30.11.99 [illegible] (фамилия, подпись, дата)

Fig. 12.

АН-12 (тип изделия)	ТАРИРОВОЧНАЯ ХАРАКТЕРИСТИКА	Канал: 8.
№ 4310 (заводской)	МП-95 (тип датчика) № 12968505 (заводской)	По выборке – В 10СС – ДАВ

[illegible]			-1	0	+1	+2	+3
Код по УПМ-1	Ход	пр.					
		обр.					
R отн. %		пр.	16.5	30.4	45.1		
		обр.	16.0	30.5			

ТАРИРОВАЛ: 30.11.99 Никитина (фамилия, подпись, дата)

ПРОВЕРИЛ: [illegible] В.В. (фамилия, подпись, дата)

Fig. 13.

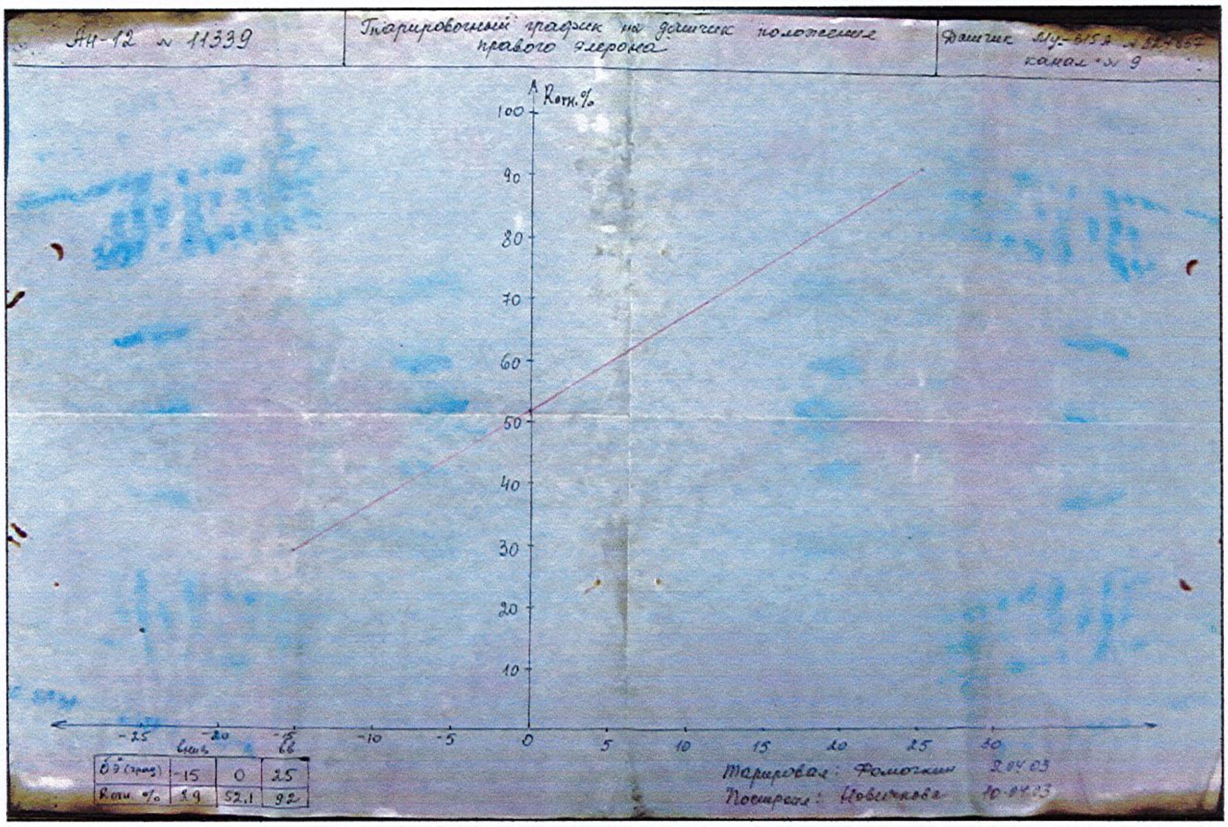
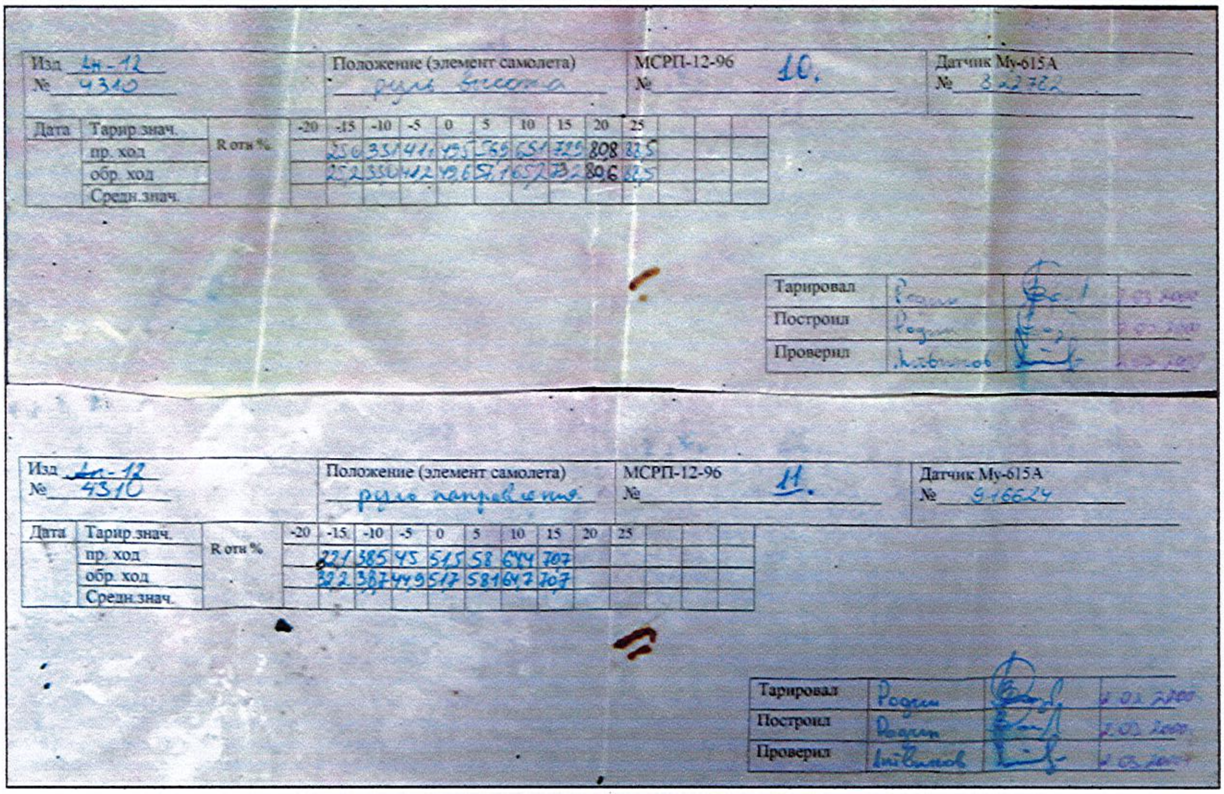


Fig. 14.



Изд Ан-12 № 4310	Положение (элемент самолета) руль высоты	МСРП-12-96 № 10.	Датчик Му-615А № 822782

Дата	Тарир.знач.		-20	-15	-10	-5	0	5	10	15	20	25			
	пр. ход	R отн %		250	331	411	495	569	651	729	808	82,5			
	обр. ход			252	330	412	496	57,1	657	732	806	82,5			
	Средн.знач.														

Тарировал	Родин		
Построил	Родин		
Проверил	Литвинов		

Изд Ан-12 № 4310	Положение (элемент самолета) руля направления	МСРП-12-96 № 11.	Датчик Му-615А № 916624

Дата	Тарир.знач.		-20	-15	-10	-5	0	5	10	15	20	25			
	пр. ход	R отн %		22,1	38,5	45	51,5	58	64,4	70,7					
	обр. ход			32,2	38,7	44,9	51,7	58,1	64,7	70,7					
	Средн.знач.														

Тарировал	Родин		
Построил	Родин		
Проверил	Литвинов		

Fig. 15.

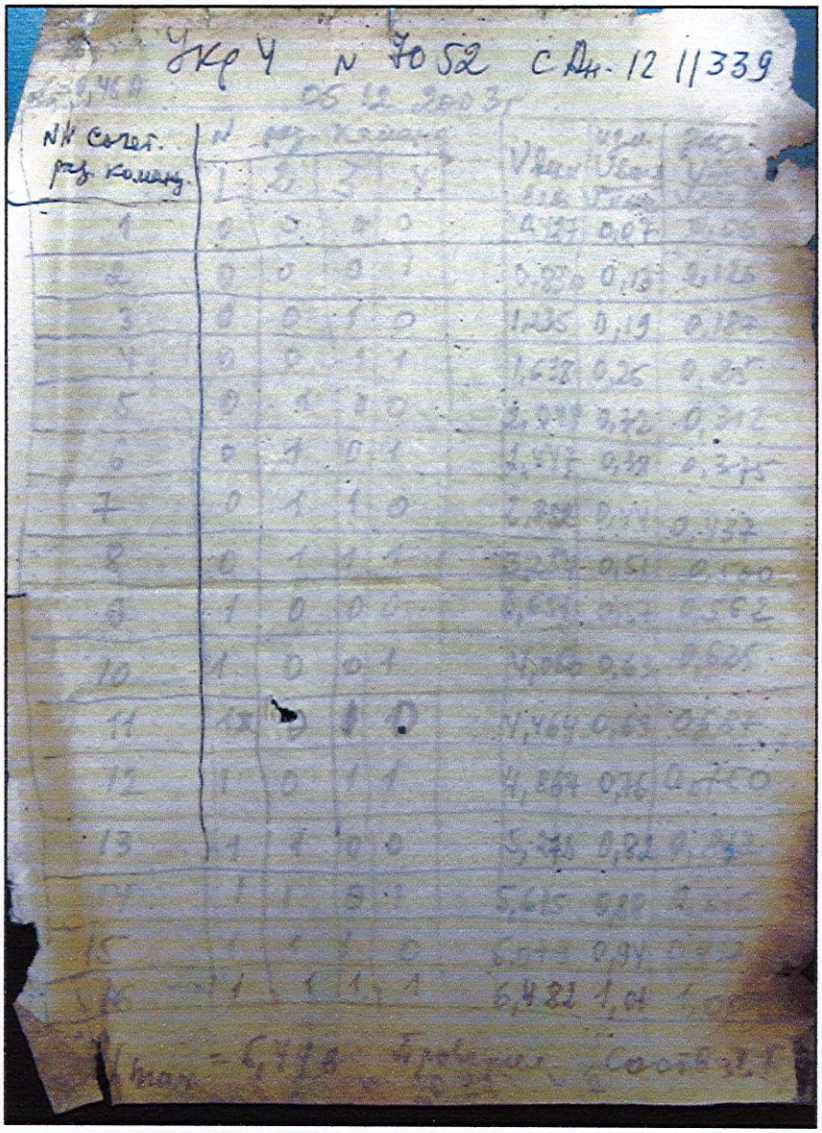


Fig. 16.

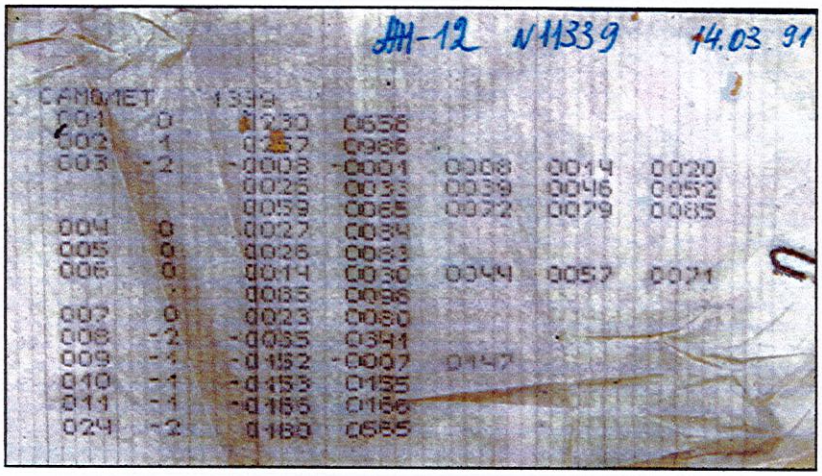

АН-12 N11339 14.03.91
САМОЛЕТ 1339
001 0 0230 0656
002 1 0257 0986
003 -2 -0008 -0001 0008 0014 0020
0026 0033 0039 0046 0052
0059 0065 0072 0079 0085
004 0 0027 0034
005 0 0028 0033
006 0 0014 0030 0044 0057 0071
0085 0096
007 0 0023 0080
008 -2 -0055 0341
009 -1 -0152 -0007 0147
010 -1 -0153 0155
011 -1 -0165 0166
024 -2 0180 0685

Fig. 17.

REGISTERED PARAMETERS LIST

System MSRP-12 Aircraft An-12

Short name	Name	Unit
IAS	Indicated airspeed	km/h
Alt.pr	Pressure altitude	m
VertAcc	Vertical acceleration	g
Ail	Ailerons position	deg
Rudder	Rudder position	deg
Elev	Elevator position	deg
Torq1	Torque indicator pressure 1	kg/cm2
Torq2	Torque indicator pressure 2	kg/cm2
Torq3	Torque indicator pressure 3	kg/cm2
Torq4	Torque indicator pressure 4	kg/cm2
Cab/Atm	Cabin/atmosphere pressure ratio	-
UKR	UKR	-

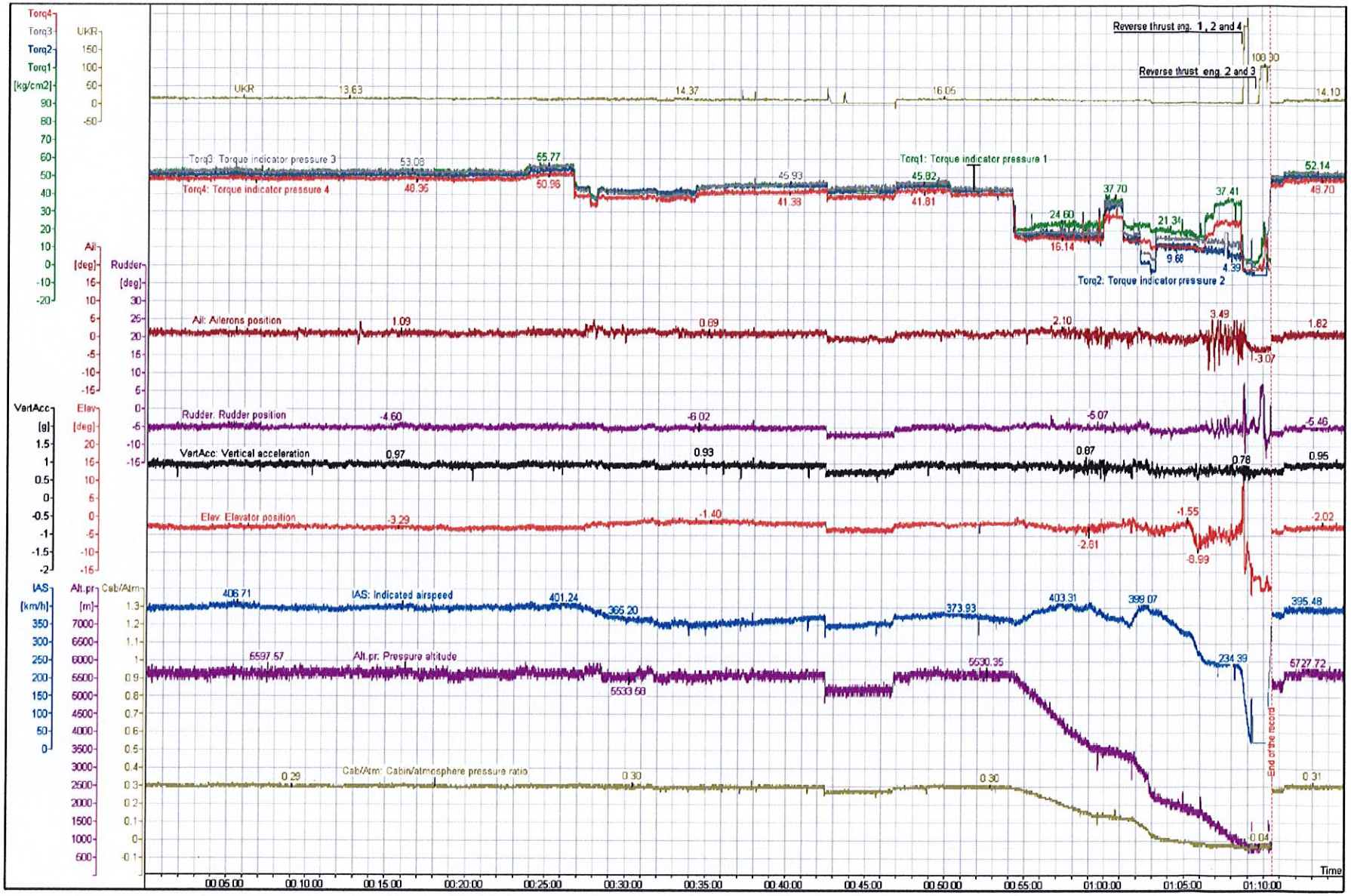


Fig 18. The FDR MSRP-12 of the aircraft An-12B S9-SVN flight information (all recorded information).

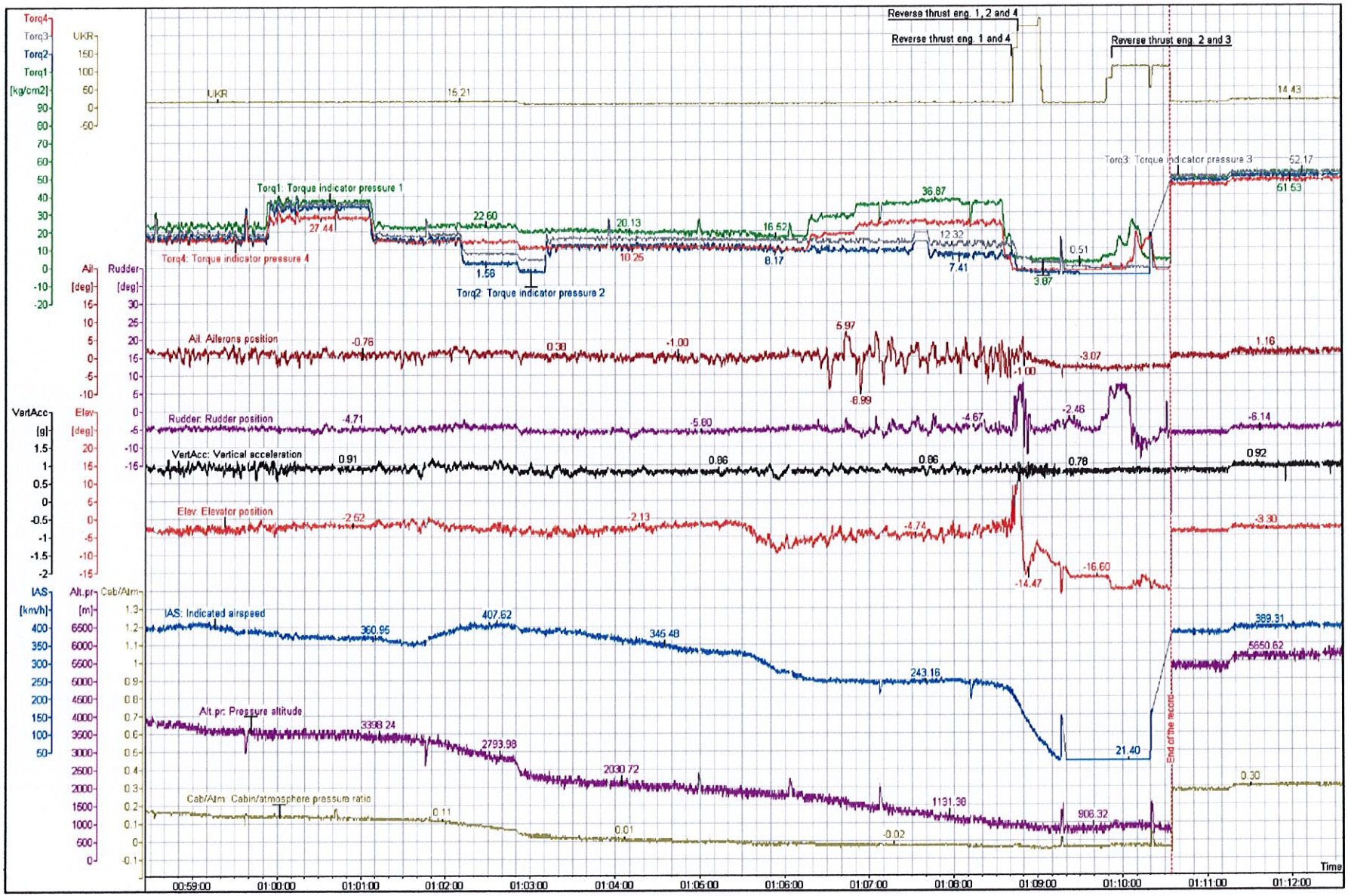


Fig.19. The FDR MSRP-12 of the aircraft An-12B S9-SVN flight information.

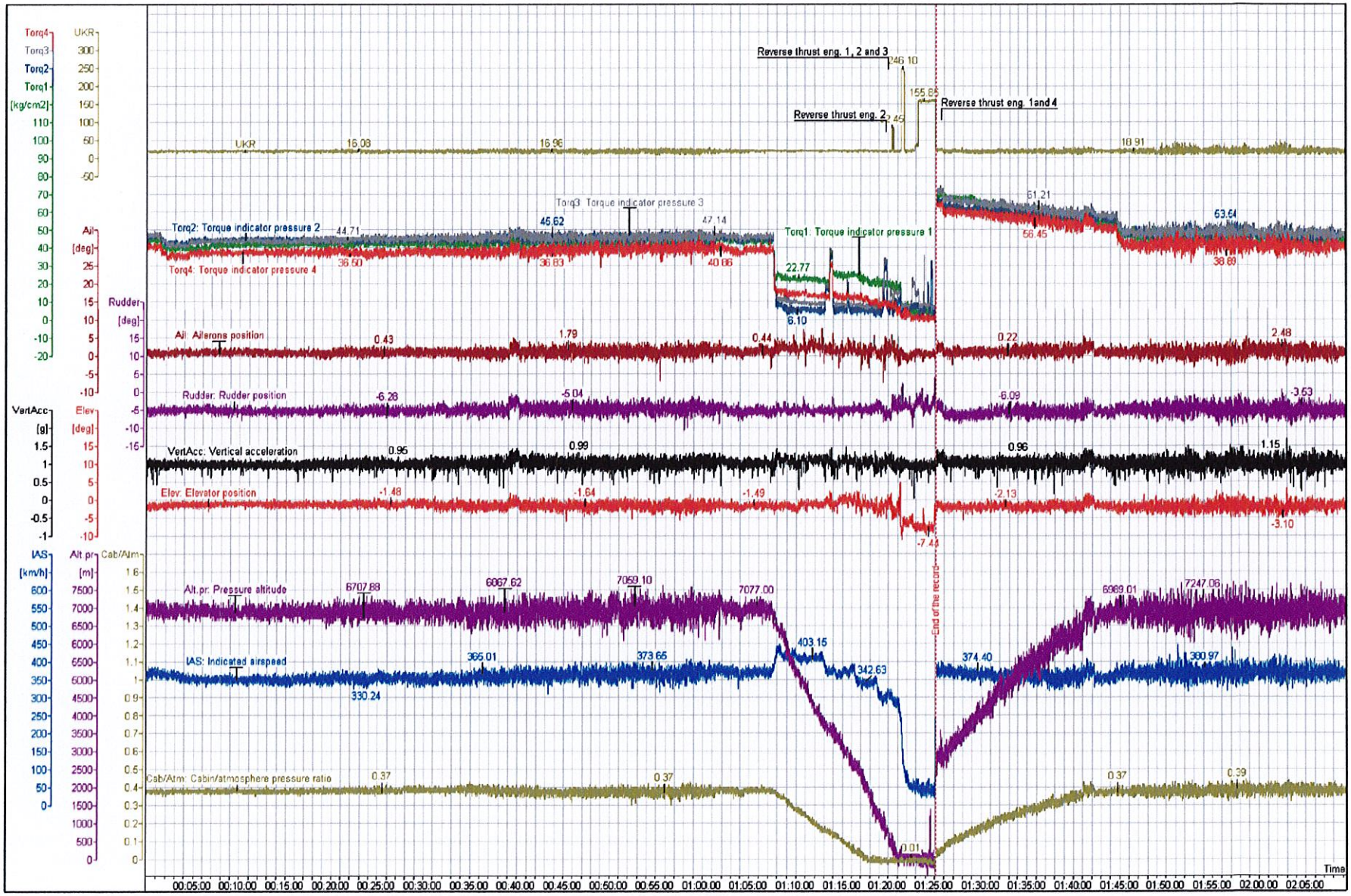


Fig.20. The FDR MSRP-12 of the aircraft An-12 flight information (second magnetic tape).