FINAL INVESTIGATION REPORT ON ACCIDENT TO INDIRA GANDHI RASHTRIYA URAN ACADEMY AIRCRAFT TB20, VT-IGC NEAR GONDIA, MAHARASHTRA ON 29/12/2008.

1.	Aircraft		
		Type	Trinidad TB-20
		Nationality	Indian
		Registration	VT-IGC
2	Owner/Operator		Indira Gandhi Rashtriya Uran Academy
			Furstaganj, Raebarelli, UP
3	Pilot – in –Command		Student Pilot
		SPL. No	IGRUA 207(A)
		Extent of injuries	Minor
4	No. of Passengers on board		Nil
	Extent of Injuries		Nil
5	Last point of Departure		Birsi Airport, Gondia
6	Intended landing place		Birsi Airport, Gondia
7	Place of accident		Karandi Dam, Vari Village, Gondia
			21º 26.36' N, 87º 35.39' E.
8	Date & Time of Accident		0700 UTC Approx
			29/12/2008

ALL TIMINGS IN THE REPORT ARE IN UTC

SUMMARY

The student pilot was authorized to carry out solo general flying by the Pilot Instructor on 29/12/2008. The sector which was authorized to fly was at 8 to15 NM between R120 and R130 at 4000 to 5000 feet. The student pilot flew on R112 over the water body and came very close to water. Thereafter he touched the water and was unable to climb to avoid the trees in front. Hence he turned left and crashed landed on the ground. The aircraft got substantially damaged however the student pilot survived the crash with minor injuries/bruises.

1. FACTUAL INFORMATION.

1.1 History of flight:

The Student Pilot holding SPL No 207(A) is of Ab-initio batch No 0542. He was authorized by the Pilot Instructor to carry out solo general flying on 29/12/2008. The aircraft took off at 06:42:13 UTC from Gondia airport. He reported at 06:47:15 UTC to ATC, Gondia about normal operation immediately after takeoff and established on R120, 7NM, 4000Ft. ATC cleared the student pilot to carry out general flying in between radial 120 and 130 at 15 NM from VOR Gondia.

As per the student pilot's statement he was engaged in setting his GPS **he drifted towards R112 over the lake area** and suddenly he realized that the aircraft was not level & straight, it was about 45 degree bank and going down very rapidly. When the aircraft was very close to water, he took evasive action and made an attempt to land at clear and free of obstruction level ground but crash landed. After crash landing at approximately 0700 UTC he informed on mobile phone to another student pilot from his batch that his aircraft has crashed on the bank of Karandi Dam near Vari Village, Gondia. He has also informed that he is safe, but the aircraft has been damaged. The academy launched the search for VT-IGC and located the aircraft at R112 and distance of 18 NM from Gondhia airfield.

1.2 Injuries to persons.

INJURIES	CREW	PASSENGERS	OTHERS
FATAL	Nil	Nil	Nil
SERIOUS	Nil	Nil	Nil
MINOR/NONE	1	Nil	

1.3 Damage to aircraft.

The aircraft was substantially damaged. The damage assessed are as follows –

a) Propeller damaged up to hub and bent about 15 inch from one side and 23 inch from the other side.

b) Right wing almost detached partially from the root with broken spar and also got wrinkled at two points towards the tip.
c) Left wing also detached partially from the root and broken from the tip near the aileron, aileron attachment also got damaged near flap.
d) Both the flaps found in bent downward position and right flap trailing edge found bent.
e) Engine seems intact but must have suffered impact damages.
f) Engine found hanging as the engine mount was found broken from the firewall.
g) Exhaust stacks, muffler and induction air intake box found damaged.
h) Alternator condenser found broken from the support and its cooling fan also slightly damaged.
i) Nose landing gear sheared out and pierced the central console and damaged the central console inside the cockpit.
j) All the controls were jammed due to collapse and shearing of nose landing gear and went into behind the firewall, were all the flight control linkages are located.
k) Main landing gear, retracted position found damaged.
l) Area between firewall and instrument panel got damaged.
m) Front plexi-glass had completely damaged and broken into pieces.
n) DME, Transponder and Marker Beacon antenna got completely damaged.
o) Left side trust fin and mooring hook (tail) found bent.
p) Both side foot-rest found missing and pitot pipes found broken.
q) Front and rear belly panel found damaged.

1.4 Other damage:

There was no other damage.

1.5 Personnel information:

1.5.1 Pilot – in – Command:

Age:	19 yrs approx
Students Pilot License:	IGRUA 207(A)
Date of Issue:	04/06/2008
Valid up to:	03/06/2013
Date of last Med. Exam:	01/04/2008

Med. Exam valid up to:	31/03/09
FRTO License No:	3276
Date of issue:	12/07/2008
Valid up to:	11/07/2018
Total flying experience:	71:00 Hrs
Experience on type:	32:10 Hrs
Experience as solo on type:	14:10 Hrs

1.6 Aircraft information:

The aircraft is Trinidad type is TB-20 and the constructors number is 1881 manufactured by SOCATA, France. The aircraft is four seater and fitted with single piston engine with propeller manufactured by AVCO Lycoming. The aircraft is low wing with retractable undercarriage.

The aircraft was inspected on 29/12/2008 vide approved schedule IGRUA:QC-20:20087:536 for daily inspection and certificate to return to service was given by AME License No. 3492(A & C). On the same day check II/30 days radio inspection schedule was carried out by AME Lic No. 5910(Radio).

The aircraft has the total capacity of four person however during the flight the aircraft was operated by a solo student pilot. The take off weight was 1060 kgs and hence loading is not an aspect under scrutiny for this accident. The Centre of Gravity of the aircraft was within the limit. The certificate of airworthiness was valid till 28/01/2009.

On the day of accident i.e., 29/12/2008 aircraft TB20, registration VT-IGC has done one sortie by the Flight Instructor and Trainee pilot between 0405 UTC and 0440 UTC. In these block time of 35 minutes 5 circuit- landings exercises were carried out. There was no snag reported on this sortie by the Flight Instructor. After the first training flight the fuel on board was 290 litres. the fuel uplifted for 2nd sortie was 36 litres making the total fuel on board as 326 litres. No oil was uplifted for both the sorties.

As per Engine log the engine type is LYCO-10540C4D5D and S/N is L-24163-48A is fitted on the aircraft. The total hrs done since new(TSN) is 5832:45 hrs and total hrs done since last overhaul(TSO) 1952:50 hrs. The condition of engine, consumption of lubrication and fuel was checked for all the 50 hrs inspection till date. The number of 50 hrs scheduled carried out till date were 38. As per the Pilots Operating Handbook the max average oil consumption is 0.946 litres per hour. However as per actual average oil consumption it was 0.07 litres per hr.

As per Propeller log the type is Hartzel and model is HC-C2YK-1BF and the blades installed has the Sl. No. J-57955 and J-57965 respectively. The propeller hub Sl. No. CH-34772B the total hrs done since new (TSN) is 3141:45 hrs and total hrs done since the last overhaul (TSO) 1197:30 hrs.

The aircraft Radio system as on 29/12/2008 had done 5185:50 (TSN) total hrs since new.

1.7 Meteorological information:

There is no Meteorological facility at the Gondia aerodrome. The tower has two instruments to give the wind speed and wind direction. Apart from this the visibility is taken care by the CFI and he gauges the visibility and clears the trainee pilot for the sorties. The airport has the obstruction chart and the pilots are cleared for sector flying taking into consideration the minimum safe altitude.

There is a wind sock for the pilots for reference to estimate the surface winds direction and its magnitude. However as per the flying academy data the weather was “FINE AND FAIR”

Cloud type & amount – NIL
Height - NOT APPLICABLE
Visibility - 5 KM
OAT - 30 º C
Wind - CALM
Turbulence - NO
Precipitation - NIL

The student pilots fly cross country and general flying in the sector allotted by ATC Gondia, however the flight plan/records of the IGRUA detachment operations did not have TAFOR, ENFOR of the day which could have been sought from Meteorological Department, Nagpur.

1.8 Aids to navigation:

The Gondia airport has following navigation aids –

a) DVOR its identification code is "GDA" and its frequency is 114.2MHZ

   Coordinate 21 º 31' 55.8" N
   80 º 17' 38.7" E

b) DME 89X and its identification code is "GDA" and its frequency is 1113/1176 MHZ

   Coordinate 21 º 31' 55.8" N
   80 º 17' 38.7" E

The airport has also got NDB for aircraft navigation.

1.9 Communications:

The aircraft was in communication with ATC, Gondia after establishing on the R120. The aircraft gave the position report and all operations normal to the tower controller. Gondia ATC has the control jurisdiction vertically from Ground to FL065 and horizontally up to 25 NM. Out of this airspace it is under the Nagpur ATC.

The VHF communication facility is in ATC, it has two system for the purpose of redundancy MAIN and STANDBY and it operates on 118.35 MHZ.

1.10 Aerodrome information:

Gondia Airport is approximately 120 km away from Nagpur Airport by road. The Gondia Airport ARP, Elevation and RWY is as follows-

Latitude 21 31' 24.78" N
Longitude 80 17' 15.66" E
Elevation 987 FT(301M)

RWY 04/22 1719M X 45M

The airport terminal buildings are under construction. The operation presently at airport is carried out by Indira Gandhi Rashtriya Uran Academy and by General aviation aircraft normally flying charters.

The runway surface is black top and the runway extension program by 580 meters is under progress.

1.11 Flight recorders:

NOT APPLICABLE

1.12 Wreckage and impact information:

The ATC, Gondhia airport had authorized aircraft TB20, VT-IGC to carry out general flying and was cleared to fly in sector South-East between R120 to R130 at 8 to 15 NM and between 4000 FT to 5000 FT. However, the aircraft after crash was found at R112 and 18 NM with respect to Gondia VOR just adjacent to the Karandi dam on dry level ground.

The aircraft took off from RWY 04 and took right turn to intercept the R120 to set course to 8 NM outbound but he did not fly in the sector authorized. He left the authorized sector by ATC and established on R112 proceeded to15 NM outbound and reached over the large water body of Karandi dam. He was practicing GPS in the process he came very close to the water level. The eye witness had confirmed that he came very close to water level gradually and could see a splash of water. Thereafter, he tried to climb, but was unable to achieve the expected Rate of Climb, hence he started turning left to avoid impact with huge trees on R112. The small piece of engine cowl was found in the plants on the bank of the water body at approx R090. The rear portion of the engine cowl had touched the plants thereby causing the portion to tear off. From here on the aircraft continuously turned left vigorously and kept coming close to ground and took approximately 87 ft to touch the nose first on the ground. The aircraft on belly went for another approx. 20 ft and propeller marks could be seen at regular interval. As the aircraft by now had hit the LH wing tip it further veered to the left and took further approx. 30 ft to come to final halt

facing 330° heading. The aircraft came to halt after touching the ground within approximately 80 ft from the first contact.

Observations of wreckage made in hanger –

01. The wreckage of the aircraft was hoisted and placed on wooden trestles to get a close view of the belly area of the fuselage.
02. Nose Landing Gear was inspected to check the position of the down lock, Hydraulic Actuator and the torque knees. **It was found that at the time of the accident the Landing Gear was in retracted position since the down lock was found free and intact while the hydraulic actuator was fully in** and was found broken from the eye end attachment due to impact. The torque knees were found apart and the nose oleo is fully extended without any signs of ground impact. However, due to ground impact the complete nose landing gear has gone inside the central pedestal at an angle towards the starboard side.
03. The **right landing gear** panels in the belly area were closely inspected and were found to have torn and crumbled indicative of severe water impact. The forward belly panel on which the Marker Beacon antenna is installed was although severely crumbled, the antenna which is the almost parallel to the center line of the aircraft was found undamaged and got dislodged from the base plate attachment.
04. The **propeller was closely inspected and the blades were found bent due to water impact as well as ground impact which is evident by the marks towards the tip of the blades**
05. All the belly panels, bottom engine cowling and the propeller were kept in the sequence and the reconstruction indicated that the belly area had touched the impacted water as it had wrinkles all through out the bottom surface.
06. Inspection was made of the **wing root area on the fuselage which indicated water marks in the form of splashes.**
07. The battery was checked for condition and voltage in as it is condition. Battery voltage was found to be 25.4V which is satisfactory since it is a 24V battery.
08. The Cockpit area was thoroughly inspected and exact position/ indication of various controls, switches and instruments were noted in power of condition. The details of the same are as under: -

Left Instrument Panel & Instrument panel strip

S. No.	Description	Reading
01	Air Speed Indicator	Needle center zero
02.	Turn Coordinator	Ball in center
03.	Artificial Gyro	Miniature shows 10° below horizon
04.	Altimeter	Big needle at approx. 420ft.
05.	Manifold Pressure & Fuel Flow Indicator	30" of Hg 4 Gal/ Hr.
06.	HIS(Horizontal Situation Indicator)	Heading - 330° VOR - 100° **Heading bug - 75°** **D-Bar aligning with VOR needle at 120°** **Heading flag and NAV flag are in view** Glide Slope flag not in view.
07.	Radio Magnetic Indicator	Compass heading 330° VOR needle at 60° ADF needle at 145°
08.	Vertical Speed Indicator	100´ climb ft/minute
09.	**Landing Gear handle**	**Down position**

Center Panel Instruments Reading

01	Oil Temperature	Lower yellow range
02.	Oil Pressure	Lower red range
03.	Fuel Quantity Gauge	Lower red range
04.	Battery	20V lower red range(Tested found 24.5 V)
05.	DR Compass	165°

Right Instrument Panel & Instrument Panel Strip

01	Air Speed Indicator	Zero
02.	Rotation Per Minutes	500
03.	Artificial Horizon	Tilting towards left, flag in view
04.	Altimeter	Approx. at 320ft.

05.	CHT/EGT Indicator	Zero
06.	CDI(Course Deviation Indicator)	255° VOR, Localizer in center position GS in center position NAV and GS flag in view
07.	Slaving Switch	At slave position CW switch in center position

Center Console CBs position

01.	Main Switch	IN
02.	Alt. field	OUT
03.	Ldg. Light	OUT
04.	Taxi Light	IN
05.	NAV Light	IN
06.	Strobe Light	IN
07.	Turn Coordinator	IN
08.	Fuel Pump	OUT
09.	**Flap Indicator**	**Retracted**
10.	Ldg. Gear CB	IN
11.	Throttle	¼ Open
12.	Prop. Lever	Low pitch (Forward)
13.	Mixture	Full Back
14.	Flap Lever	Forward
15.	**A/P Master**	**ON**
16.	Radio Master	OFF
17.	Pitot Heat	OFF

1.13 Medical and pathological Information:

The blood sample of the student pilot for examination it was collected by Medical Officer, K T S General Hospital, Gondhia. These sample was forwarded to Regional Forensic Scientific Laboratory, Nagpur. The forensic report states blood sample forwarded contains“ NO ALCOHOL”

1.14 Fire:

There was no fire though aircraft had approximately 300 ltrs of AVGAS before impact. The aircraft had not impacted vertically

however it had got dragged horizontally and stopped in a very short distance approx 80 ft. since the wings had got detached from the attachment points and no damage to the wing tanks was reason for no fire. The slight fuel was coming out from the nose portion because the fuel to engine line had snapped. However the fuel flow was very little and was getting quickly absorbed in the ground.

1.15 Survival aspects:

The crash was survivable as the terrain where the student landed was level ground with any visible obstruction. The student pilot had almost leveled the aircraft before the impact point had caused no disintegration of the airframe thereby making the crash survivable.

1.16 Tests and research:

The oil and fuel samples of the accident aircraft was sent to DGCA, {R & D} Directorate for testing for compliance of specification.

a) The aviation Gasoline 100 LL sample tested had passed the entire specification test for the characteristic.
b) The Lubrication Oil sample had tested had not passed the specification requirements for appearance, kinematic viscosity at 100, flash point and acid number.
The remarks state that the sample do not meet t he specification requirement and this variation may be due too oil oxidation and service reason or from extraneous solids such as dust and dirt.

The Engine of VT-IGC involved in accident was sent to M/s Bombay Flying Club for strip examination and further inspection in order to ascertain any deficiency in it. Engine details are –

Engine type : Lycoming I0-540 C4D5D
Engine Serial No : L-24163-48A
Engine TSN : 5832:45 hrs
Engine TSO : 1952:50 hrs

The following observations were made during course of engine strip investigation –

a) Detailed investigation did not reveal any damage although a lot of mud was found deposited all over the engine.
b) All 12 spark plugs were removed and their position was marked on each of them. All the spark plugs were visually inspected for condition. No abnormality was noticed except traces of oil in the bottom spark plugs of cylinder number 1 & 5. however both the spark found serviceable.
c) All the accessories, ignition harness, engine hoses and metal pipelines were removed and inspected for any sign for abnormality, nothing was apparently found except for alternator which was found to have some damage in the cooling fan and drive pulley due to impact.
d) The engine was rotated externally from the propeller flange with the help of crowbar. The engine was found rotating smoothly without any obstruction.
e) All six cylinders were checked while rotating to ascertain whether they are developing compression by blanking one spark plug and checking other. All the cylinders were found to develop compression.
f) Each cylinder was removed and checked for condition. The cylinder head and barrel of all the six cylinders were found satisfactory and the pistons and connecting rods were found in good condition. The piston rings in all the six pistons were found intact. During disassembly some of the piston pins were found comparatively tight while driving them out to remove the piston from connecting rods
g) Oil sump and rear accessory drive cover was removed. Condition of both units was satisfactory.
h) The crank shaft was removed and the bearings were found to have abnormal rubbing marks on the ends of bearings.

1.17 Organizational and management information:

Indira Gandhi Rashtriya Uran Academy, Fursatganj, Rai-Bareilly, UP is flying institution approved by DGCA under category G. The institute has got adequate Flight Instructors and Ground Technical Instructor. The GPS classes are normally conducted at Fursatganj and hence the student had not been trained on the functioning of GPS.

1.18 Additional information:

1.18.1 Maintenance Aspect:

The aircraft is installed with ELT however it did not trigger the emergency frequency. The trainee pilot had himself come out of the aircraft and informed his friend with his mobile phone about the accident and his location.

1.18.2 Operational Aspect:

The trainee pilot reported at Gondia from Rae Bareli for continuation of his flying training on TB20 aircraft. Prior to this he had completed approx 50:00 hrs flying training on Zlin 242L aircraft at Rae Bareli and had flown about 21:00 hrs on TB 20 aircraft. On 22/12/2008 Flight Instructor had flown with trainee pilot for general flying and circuits and landing and he was found Student trainee pilot as average student. Thereafter the involved trainee resumed his normal general flying and circuit landing on 23/12/08 has carried out 3 solo general flying exercise of approx 1 hr, similarly on 24/12/08 has done 3 solo general flying exercise of approx 1 hr, on 26/12/08 the trainee carried out checks and procedure with Flight Instructor, and also on 26/12/08 carried out solo circuit landing for 1 hr. on 27/12/08. He also carried out 3 solo circuit & landing exercise of approx 1 hr on 27/12/2008 and finally 29/12/08 when he was authorized for general flying and was involved in an accident.

The CFI who is head of the flying training stated that before commencing the training for students of IRGUA in Gondia the practice is to brief the students on the airfield layout, the circuit leaving/ joining procedure and the local flying area. Briefly each of the area is discussed separately. The briefing also include the airfield layout, the runway orientation, runway length, type of surface, lighting system, availability of PAPI, airfield elevation, touch down zones with restriction if any. The briefing also includes location of ATC, the VOR, the NDB, the ARF and other important features of the airfield. The students are taken to ATC for familiarization. The student are briefed about the circuit procedure which is always left

hand circuit. The circuit is flown in the same manner as stipulated in the Training Manual, the same is briefed in the context of Gondia airfield with reference to ground features that could be identified on ground for additional assistance. The detachment of IGRUA at Gondia carried out in 2007 and in 2008 not withstanding the experience any student had whether 75 hrs of flying or 150 hrs: each student was given dual instructional flying at Gondia before permitting to fly solo there. This was done to familiarize the student with new environment, the local flying area and then carrying out 2 or 3 circuits so that he is conversant with the local procedure and is at ease in his solo sorties. For the detachment at Gondia which commenced in Dec 2008 a mass briefing was carried out in the last week of Nov for those slated for Gondia by detachment Instructor. It was repeated in Gondia especially covering the changes since 2007.

1.18.3 A sortie profile was flown on 22/04/2009 on TB-20 aircraft VT-IGF to ascertain the automation level used in accident flight.

1. After take-off on runway 27, the pilot climbed straight ahead on HDG 270 deg to 2000 ft. Auto pilot (AP) with HDG mode was selected at 1600 ft and arming panel selected to a rate of climb of 700 ft / min. The aircraft climbed on outbound track 270 that was being flown. Another 100 ft later, NAV mode was selected. The NAV annunciator flickered but the mode did not lock. A turn was initiated at 2000 ft to an approximate reciprocal heading of 090 deg to the VOR. NAV mode was captured with about 45 deg to go but within 5-7 deg of radial. The aircraft was flown on NAV mode till overhead VOR. Aircraft was leveled out at 4000 ft. As the aircraft flew over the VOR, the NAV flag came on but the lock did not break. Aircraft was now flying on HDG 090 deg approximately. When aircraft had flown past the cone of confusion, the NAV flag went off, but the NAV lock on Auto-Pilot remained on. After about 2 DME, a turn was initiated towards the VOR, roughly on a westerly HDG. The aircraft closed on to radial 090 with course curser to 270 deg but by this time, the since aircraft was again nearing cone of confusion, it could not align fully/capture it fully. As the aircraft flew again past the VOR, the

NAV flag appeared but the NAV light did not go off. Once out of cone of confusion, the aircraft did not intercept radial 270 deg when the course curser had been set to 270 deg. In fact it drifted to radial 240 deg but the NAV light on Auto Pilot was steady. NAV mode was disconnected and HDG mode selected to fly the aircraft on radial 270 deg. Once radial 270 deg was obtained with the help of HDG mode, a descent was commenced to 2000ft on AP with ROD 200ft/min. The NAV mode on Auto-Pilot was reselected. The VOR was then switched OFF at base. The aircraft maintained its heading of 270 deg and also maintained its rate of descent till 2000 ft. Auto-Pilot with all its mode was deselected at 2000ft.

2. The aircraft was climbed to 3000 ft. A 30 deg bank turn was made. The aircraft remained stable and showed to no tendency to increase/ decrease bank to a limit where recovery could be a question.

3. The aircraft was again leveled out at 3000ft with wings level. It was trimmed for 120-130 kts. A 30 deg bank turn was made; it was then increased to 45 deg, the speed built up to about 150 kts. The control column was released and the aircraft eased itself to a climb attitude.

The above exercise was indicative of the fact that when the aircraft flew outbound Gondhia the student pilot most probably selected the VOR mode while flying outbound on the R120 initially but it did not lock. Then subsequently the NAV flag came on as he was flying outbound VOR Gondhia. He in all probability selected heading mode and proceeded on to R112 with auto pilot ON. On approaching the water body he descended with an intention to come over the water very low. This was the reason why the red NAV and HEADING flag was on the HSI.

1.19 Useful and effective investigation techniques:

NIL.

2. ANALYSIS:

2.1 Serviceability/Maintainability of the aircraft:

The aircraft had valid certificate of Airworthiness. To check the condition of engine, consumption of lubrication and fuel was checked for all the 50 hrs inspection till date. The number of 50 hrs scheduled carried out till date were 38. As per the Pilots Operating Handbook the max average oil consumption is 0.946 litres per hour. However as per actual average oil consumption it was 0.07 litres per hr.

The average actual fuel consumption calculated over all the 50 hrs schedule till date was 50 litres per hr.

Till date there were 12 airworthiness directives which had been made DGCA mandatory modification and all had been complied on this aircraft VT-IGC till date.

Further, the aircraft VT-IGC had been given the certificate of release to service by AME License No 3492 in the morning of 29/12/2008. The aircraft was fully serviceable in all respect to be certified airworthy. It was found from Flight Release Book that the aircraft was flown by the trainee pilot with instructor on board successfully for 45 minutes and did not report any snag. Thereafter the aircraft was taken by trainee pilot for solo general flying and met with an accident.

The examination of the propeller blades reveal that the engine was on power till the time of crash landing. The propeller blade tips have curled in against the direction of forward motion. Hence problem in engine is ruled out in the present context. The engine examination has shown no engine distress however the crank shaft bearing has shown the unusual rub mark indicating acceptable level of vibration. The spark plug No.1 and 5 where found having more fuel indicating improper firing it was checked with the corresponding piston and those piston were found having black soot deposited on them. The oil

test sample as per R & D Lab was oxidized and the reason was due to dust and dirt. However this was not the reason for crash and also there was no evidence for engine failure as the aircraft had made one hour sorties prior to the accident flight. The paint marks on the blades are intact and does not show the rub mark at the tip signifying that the aircraft had touched the water before making the impact on ground. The composite engine cowl had rubbed with the ground and damaged. The metallic sheet engine cowl had warped this is also an indication of aircraft engine cowl bottom area receiving water impact.

The water has come over the wings as during the instance of the touching the water the aircraft must have attained the positive attitude and also the fact is aircraft has got low wing. It had taken approximately 6 to 10 seconds from the time aircraft came in contact with water and the final crash. Hence the mud which had come off due to rubbing of the aircraft on ground had attained the laminar streaks over the wing leading edge and on trailing edge at wing root. These again prove the fact the aircraft has touched the water before crashing.

On the basis of the above statements of the pilot and eyewitness it is amply clear that the aircraft had touched the water and the engine was producing power till the aircraft came to complete halt. The engine had no problem and was in serviceable condition.

2.2 Operational Aspect:

Pilot Factor : The trainee pilot stated that he started his flying in Gondia on 22/12/2008. He had total 70:45 hrs of flying experience out of which 10:00 hrs of solo flying on TB 20 aircraft in Gondia till 29/12/2008. On 29/12/2008 he went for a general flying solo at 0630 UTC on the aircraft VT-IGC. He was instructed by ATC, Gondia to operate between R120 to R130 and 8 to 15 NM between FL0040 to 0050. He took off from RWY 04 and turned right to intercept R120 from VOR GDA. At 10 NM he passed his radial/sector established call and started going through GPS as he was to start with X-Country navigation flying after 4 more hrs of solo flying. He looked at instruments and found out he was 16 NM at 4000 FT between R118 to R120, he made a 180 medium turn of Aircraft On Bank for 30 deg.

The aircraft by now had drifted to R112 and was over the water body. While he was in turn he again started going through GPS and the next thing he felt was that he was descending rapidly. He looked at ADI it was showing bank angle of 45 deg and 10 deg below the horizon and aircraft speed was about 120 -125 Kts with 1200 FT rate of descent. He instinctively pulled the control column back as much as possible with 45 deg bank. This led to the speed rapidly washing off at very fast rate he had also put on bank, the wings were not level. Trainee pilot then started to level his wings and during this stall warning came ON, the aircraft stalled before he could react and during this time he was making the correction to the wing level off with aileron instead of rudder. At that moment he could not comprehend what was happening and he completely froze. Thereafter he could feel that he was going towards the ground at a very rapid rate. By the time he could react he was very close to ground hence he reduced bit of throttle and applied right rudder. The aircraft did not give any clear perspective to him and was not under his control and was unstable. At that time he may have hit ground/water beneath him. He pulled the aircraft as much as he can next thing he realized that he was very low and was about to go in the high tress right in front of me. He reduced the throttle and turned the aircraft to left side to avoid the trees. The next thing he realized that he was in dust and pieces of windshield hanging in front of him. The aircraft after crash was found on R112 at 18 NM with respect to Gondia VOR. He informed his batch mate about the accident and cut-off the engine and also put magneto off.

Number of eyewitness account were taken, two among them who were very close has stated as follows-

A) Mr Narayan Panjre stated on the day of accident the aircraft came very close to the lake around 10 FT immediately there was a fountain of water since he was far he cannot tell exact distance at which it came down however the water fountain was very clearly seen by him. Thereafter the pilot tried taking the aircraft UP but since the trees were right in front he had to turn the aircraft and immediately the aircraft fell on ground and after rubbing for while stopped at some distance.

B) Mr Sher Singh and Karthik stated the aircraft had been coming to the lake side from two days but used to circle and leave however

on the day of accident the aircraft came right in the center of lake. The aircraft had come very close to the water at about 6 to 7 FT approx. Thereafter pilot tried to lift the aircraft but since the tall trees came right in front to save aircraft he had to turn the aircraft and immediately fell on the ground.

The examination of cockpit instrument indicates that the heading bug was set at 075° and HSI cursor was at 098°. The trainee pilot had accepted using heading mode for radial interception as at that time the NAV mode was not engaging but the bank increased from 20° to 30° and then to 45° so he disengaged the auto-pilot. This is not true as the Auto pilot was found engaged till the crash occurred. The trainee pilot had in his statement tried to alter the sequence of event. The trainee pilot has not been taught the use of autopilot and his navigation cross-country had not started then. He out of his own curiosity had gone through the manual and was practicing navigation with autopilot during his solo general flying.

From the above statements, instruments, wreckage, impact and the on site investigation carried out it indicate that the pupil while training has carried out those exercise which were not authorized by the Flight Instructor. The student pilot on getting the clearance from ATC to proceed for the sector between R120 – R130 he went on R120 over the outbound for 15 NM. He had used the autopilot flying out bound VOR-GDA. He selected NAV mode and initially proceeded on R120 as the D-Bar was aligning with VOR needle at R120 on PIC side HSI. This setting was confirmed from the cockpit indications. **He probably manipulated the HDG and reached over a water body which was on the R112.** When he planned his descend on autopilot his NAV flag came ON as he went out of line of sight of VOR. He continued his descend on the HDG mode and continued to approach water. The trainee student had put autopilot ON and approached at the center of the lake. However he had no knowledge about the propeller touching the water and subsequent reduction of speed due to impact of water. The spilling of water to about 10 to 15 Ft created a very frightening illusion. The trainee pilot thus pulled the aircraft UP there by further washing the speed. By then, he thought that he will not be able to cross the tall trees right in front of the flight path. Hence he turned to the left viciously and he got a stall warning. This stall warning was only when he turned to avoid the tall trees and not prior

as the eye witness did not see the aircraft turning. The approached straight-in and very gradually over the water and there was no turn executed by the trainee pilot. Subsequently when he turned to the left viciously he got the stall warning then he tried to level but by then he had already touched the left wing on ground and crashed landed on belly. **The aircraft was found on R112 at 18 NM from VOR Gondia**.

3. CONCLUSIONS:

3.1 Findings:

a) The aircraft had valid Certificate of Airworthiness.
b) The aircraft was maintained as per the approved maintenance programme.
c) The aircraft had a certificate of Release issued by AME and made a sortie for one hour prior to accident sortie.
d) The ELT did not activate and the search was done on the basis of location relayed by the trainee pilot.
e) The engine was producing power till the aircraft came to halt.
f) The trainee pilot had un-authorizedly flown on the R112 and 18 NM as against R120 to 130 at 4000ft to 5000ft sector cleared by ATC Gondia. Thereby violating ATC instructions.
g) The pilot had made a deliberate attempt to come close to the water thereby causing the propeller blades and engine cowl lower portion to touch water, thereby causing blade to bend without paint being rubbed off.
h) The engine strip examination revealed that the crank shaft bearing having the rubbing mark indicating slight vibration of crank shaft.
i) The trainee pilot has also operated the GPS and Autopilot though he had not been taught about its operations.
j) The Heading flag on HSI was in view indicating that the trainee pilot has put on the Auto-Pilot while proceeding on outbound radial 112.
k) The VOR flag on HSI must have come on when the signal of VOR became weak on descending below the line of sight as the downstream of Karandi dam is surrounded by hills.
l) The Flap lever was forward and the flap indicator was in retracted position, the flap motor also indicate that the flap was in retracted position(ZERO)

m) The landing gear lever was down however the landing gear was in retracted position and locked.
n) The clean configuration indicates that the aircraft approached water at very high speed and the speed got washed off abruptly on touching water and pulling up simultaneously.
o) The aircraft after pull up from the lake took steep left turn to avoid crashing into the high trees in front of aircraft flight path thereby stalling the aircraft from a low height.
p) During the turn the aircraft lost the height and hit the ground damaging the left wing and the under belly structure including landing gears.

3.2 Probable cause of the accident:

Not adhering to the Standard Operating Procedure was the cause of accident. Using autopilot without functional knowledge and flying low so as to touch the water were the contributory factor for accident.

4. SAFETY RECOMMENDATIONS:

4.1 All the flying clubs shall carry out feasibility for GPS up-gradation to record and download the flight path flown by the trainee pilot on computer to verify with the exercise authorized by the Flight Instructor.

4.2 The action deemed fit may be taken by competent authority against the trainee pilot.

Place: Mumbai -29
Date:. 30.06.2009

(Sanjay K Bramhane)
Senior Air Safety Officer(Engg)
Inspector of Accident(VT-IGC)