Case Report

Delay in decision to eject: lessons from two recent fatal accidents

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ABSTRACT

Two recent fatal aircraft accidents on the MiG 21 ac are discussed. Both involved young, inexperienced pilots who had come to operational squadrons after being declared day ops on Type 77 air craft. In one accident the pilot was attempting to carry out a low speed loop at 700 kmph. When the air craft stalled on the top of the loop he was aware of his situation, but did not attempt ejection despite advice from the leader, since he was wrongly convinced that he could recover. In the second case, the young pilot was doing an unsupervised procedures sortie, wherein he was expected to carry out barrel rolls among other procedures. He apparently stalled the ac during a barrel roll and crashed in attempting a recovery. Ejection had not been attempted. Analysis of previous sorties revealed that the pilot was not comfortable performing barrel rolls on this air craft, although he did not reveal this to his supervisors. The paper discusses the possible reasons for the fatal delays in the decision to initiate an ejection. These include inexperience, moral conflicts in self-created situations, overconfidence and lack of reliable warning systems. It focuses on the possible problems on converting from Type 77 air craft to Type 75 and Type 96. It also highlights the need to carry out a survey among young fighter pilots to ascertain their comfort levels in progressing through the ops syllabi for Type 96 and Type 75 air craft.

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In the last year there has been an alarming increase in the number of fatal aircraft accidents in the IAF. All fighter aircraft and most trainers except the HPT 32 are equipped with ejection seats. Thus, pilots theoretically speaking, always have a chance to escape from unserviceable aircraft or uncontrolled flight situations. In most modern seats, once an ejection is initiated, failure of the ejection seat itself is rare. Delay in the decision to initiate ejection is therefore the single most important reason that leads to fatalities in fighter aircraft accidents. What are the factors that contribute to this delay? This paper attempts to analyse these factors in the light of evidence from two recent fatal aircraft accidents in Western Air Command.

Fg Offr MS, a 24 year old UFT ops pilot got airborne in a MiG 21 type 96 aircraft for a low speed handling solo sortie with a supervisor in another aircraft as 'chase'. Take off and climb to sector was uneventful. The pupil pilot then satisfactorily carried out 4 1G stall, co-ordinated turns and nose high recovery. This was followed

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by commencement of a low speed loop at 700 km/h at 2.5 km on QNH. On reaching the top of the loop after about 34 sec of commencing the same, the trainee pilot's aircraft stalled and soon entered a stalled spiral. The leader responded initially by giving a call of "check height" and "wings level" followed by a clear call to "eject". The pupil pilot responded by replying "unstalled ....er... unstalled" after about six seconds of the call to eject. The supervisor then queried "confirm recovered" to which Fg Offr MS replied "recovering sir". The aircraft crashed after about four seconds of this call while the leader kept shouting "Eject, Eject, Eject!".

In this case, the following salient features emerged:

a) The syllabus for type 96 aircraft was at great variance with that for type 75 aircraft that is flown by the other squadron at the station. The speeds for low speed loop were 700 km/h for type 96 aircraft and 800 m/h for type 75. This kind of difference was unwarranted.

b) The young pilot was not comfortable in the low speed loop. On earlier occasions he was unable to execute it at 800 km/h. However, each time he had been able to recover the aircraft from stall.

c) Both the pilot and his leader were perhaps convinced that even if the youngster could not complete the loop at 700 km/h, he would at least recover the aircraft from stall.

d) The young pilot when faced with the stall on top of the loop was either convinced that he could recover the aircraft, or he felt a moral need to recover from a self-created situation.

e) All the other young pilots in the squadron when questioned were hesitant to admit that a low speed loop at 700 km/h was difficult to perform at this stage of the syllabus.

Case 2

Fg Offr RG, a 24 year old U/T ops pilot got airborne in a MiG 21 Type 75 aircraft for a 'procedures' sortie. He was cleared to do aerobatics including barrel rolls. After establishing himself overhead, the pilot gave two ops normal calls at 4.0 km and 4.5 km. The aircraft was not in radar contact sometime after the last call and crashed about 8 km off base about 12 min after take off. Investigations revealed that the pilot had not attempted ejection. In all probability, he was in fact holding the stick back with positive force till the moment of crash.

In this case, the following salient aspects were brought out:

a) The U/T ops pilot had been claiming successful completion of manoeuvres in the air when in reality (as per SARPP analysis) he had not been attempting such manoeuvres at all. The reason for this appears two-fold:-

   i) The pilot was not comfortable in handling the Type 75 aircraft (compared to the Type 77 aircraft), and

   ii) He failed to admit this discomfort and under-confidence to his flying supervisors.

b) Eyewitness accounts and the angle of impact suggest that the aircraft was in a stalled state of flight. Did the pilot fail to recognise the stall?

c) The pilot did not make any R/T call after his ops normal call at 4.5 km. He, however, maintained positive backward pressure on the stick till the moment of impact, which precludes incapacitation. It appears, therefore, that the pilot was (wrongly) certain of his ability to recover the aircraft till a very late stage.

Reasons for delay in decision to eject

There are several reasons that lead to a delay in the decision to eject. These include physiological causes like G-LOC, disorientation, hypoxia etc. and pathological causes like incapacitation due to several reasons. In the subsequent paragraphs, however, only those reasons are being discussed wherein a pilot is otherwise apparently healthy and yet delays taking that decision to initiate ejection.

Flying Experience: A comparative analysis of the flying experience of the two pilots is as follows:

Hours Flown	Case 1: Flt Offr MS	Case 2: Flt Offr RG
Total Hours	363 h	318.55 h
Total Solo	175 h	123.50 h
On type	26.40 h	4.10 h
Solo on type	17.50 h	2.00 h
Ex MOFT	Yes (Day Ops T-77)	Yes (Day Ops T-77)
Break in Flying	No	Yes (5 months after MOFT)

The low level of experience both overall and on type is apparent. Equally clear is the fact that both pilots were Day Ops on a variant of MiG 21 (Type 77).

The low level of experience, on type could have led to delay in decision to eject because of:

a) Inability to realise the futility of continuing to attempt recovery.

b) Under-confidence in handling the aircraft which leads to a need to prove flying skills to oneself as well as to peers and supervisors.

Inexperience cannot diminish the will to survive. However, it is possible that inexperienced pilots feel more secure in the cockpit rather than in abandoning it.

Self-Created Situations: When there is an aircraft malfunction like engine flame out, or fire, or some external cause like a bird hit which renders the aircraft uncontrollable, a pilot does not hesitate in initiating an ejection. However, when the emergency situation is perceived by the pilot as self created, there is definite hesitation in initiating ejection. The moral force within perhaps pressurises the pilot to keep attempting recovery till a very late stage.

Freezing on controls: When faced with an emergency, the workload in the cockpit can suddenly increase to an extent that cerebral activity goes into overdrive. Adrenaline is pumped up and results in extremely high levels of arousal, which is detrimental to psychomotor performance. Susceptible individuals would then tend to freeze on the controls and at times are unable even to make an R/T call.

Perceived safety in cockpit: The aircraft cockpit provides an environment, which appears very safe to many pilots. Abandoning such a cocoon like space for the unknown can be an extremely tough decision to make for these flyers.

Lack of reliable warning system: Although the MiG 21 aircraft have a radio/baro altimeter low altitude warning, this is anything but foolproof. If there was a clear warning built in the aircraft on hearing which the pilots could be trained to eject; it could perhaps have saved lives in situations where pilots were somehow lulled into believing that recovery was still possible. (When actually the ground clearance had been insufficient).

Past success: with or without recognition: Success in bringing back a disabled aircraft with very marginal control is an event that induces a sense of pride. This self appreciation is transmuted into a high level of confidence. If the performance

is also recognised, on the next occasion he is likely to do 'his best' and can delay ejection till too late.

Problems of Ex-MOFT pilots

Is MOF training and achieving Day Ops status on Type 77 aircraft making our young fighter pilots a trifle over-confident? Most pilots during informal discussions revealed that handling the Type 77 was much more comfortable than the other two MiG 21 variants. The thrust to weight ratios are comparatively less in Type 96 and Type 75 and the nose is heavier in the Type 75 because of the Almaz. The vision afforded to the pilot is better in Type 77. Another important difference pointed out by supervisors was the sudden change in levels of supervision. Sorties are generally supervised during MOFT phase and presence of a large number of peers makes it easy for even an introvert to be able to talk about his apprehensions and problems. The difference may be likened to moving into college after being in school. After coming to operational squadrons, young pilots do not perhaps realise these differences and tend to become over-confident.

Is the over-confidence in the Ex-MOFT pilots precluding a frank expression of fears and inhibitions to supervisors? Most U/T Ops pilots were unable to satisfactorily go through the LSH loop at 700 km/h, but did not express this difficulty to their supervisors. They had satisfactorily performed the low speed loop in Type 77 at 750 km/h and hence considered themselves capable on Type 96 as well. Similarly, as in Case 2, the pilot had definite discomfort in performing barrel rolls on Type 77, hence perhaps he had the feeling that things should work out well on the Type 75 as well. He had no problems performing aerobatics on the trainer, since the Type 69 trainer handles better and the same is also in use at MOFT units, but when things did not work smoothly on the fighter, he found it difficult to acknowledge.

Certainly training at MOFT establishment must be very useful for operational fighter flying in future. I am sure that the benefits far outweigh any possible negative effects. However, if there are pitfalls (more like side effects of useful medicines) then we must analyse and remedy them.

Suggestions

Suggestions to remedy the malaise need to be obtained from pilots across the spectrum; from experienced QFIs and supervisors to young ex-MOFT pilots themselves. The following need to be considered:

a. An anonymous survey be designed by the Institute of Flight Safety to ascertain perceptions of ex-MOFT pilots and supervisors on the differences between Type 77 and Type 96/Type 75 aircraft. Apart from experienced pilots, the service of an Aviation medicine specialist and a psychologist must be availed in designing and interpreting this.

b. Explore the possibility of retrofitting a reliable altitude warning device to force a decision to eject in a pilot who freezes on the controls or is wrongly convinced of succeeding at recovery of the aircraft.

c. Designing and incorporating an 'Ejection Simulator' for training of aircrew at IAM/AMTCs. On instruments, pilots should be exposed to certain situations of flight to study the decision making and response time, for initiating ejection. Alternatively this kind of simulated situation could be included in the Air Combat Simulator which is frequently used by most pilots.

Conclusion

A fatal aircraft accident is a tragedy for the near and dear, the squadron, the station and

indeed the entire Air Force. We must leave no stone unturned to try and reduce the fatalities in aircraft accidents. Delay in the decision to eject can be attributed to inexperience, moral conflicts, overconfidence and lack of warning systems. Ex-MOFT pilots may be unknowingly becoming victims of over-confidence, because of their status as Day Ops pilots on Type 77 ac. This may be directly attributable to both, differences in handling of different types of the MiG21, as also to the sudden change in supervision styles between MOFT units and other operational units. Typical problems of the Ex-MOFT pilots of IAF need to be analysed and addressed. Some suggestions made may appear outlandish but strange problems need to be dealt with stranger solutions.