N82-15025

NASA Technical Memorandum 81274

NASA Aviation Safety Reporting System: Quarterly Report No. 13

September 1981

NASA

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NASA
National Aeronautics
and Space Administration

Scientific and Technical
Information Branch

1981

TABLE OF CONTENTS

NASA AVIATION SAFETY REPORTING SYSTEM

QUARTERLY REPORT NO. 13

Ames Research Center

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SUMMARY

ASRS Quarterly Report No. 13 presents a selection of aviation safety reports that relate to loss of control in flight, problems that occur as a result of similar sounding alphanumerics, and pilot incapacitation. A separate research study, which deals with problems related to the go-around maneuver in air carrier operations, is also included. The Alert Bulletin section contains a sampling of bulletins (and FAA responses to them) that pertain to air traffic control systems and procedures.

INTRODUCTION

This is the thirteenth in a series of reports based on safety-related incidents submitted in narrative form to the NASA Aviation Safety Reporting System (ASRS) by pilots and controllers (refs. 1–12). ASRS operates under a memorandum of agreement between the National Aeronautics and Space Administration and the Federal Aviation Administration.

The report contains a detailed study of air carrier aircraft go-around maneuvers, derived from the ASRS data base. The study is preceded by a selection of reports dealing with aircraft loss-of-control incidents, problems associated with similar sounding names and numbers as used in flight operations, and pilot incapacitation situations. A concluding section presents a number of Alert Bulletins issued by ASRS, and the FAA responses they have elicited.

AVIATION SAFETY REPORTS

As customary, this report includes a selection of report narratives, submitted by pilots and controllers, that are illustrative of specific safety topics. One study of instances in which aircraft control has been lost in flight, another that deals with problems arising from confusion of similar-sounding names and numbers, and a third on pilot incapacitation are discussed.

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Loss of Control in Flight

During the 25 months between May, 1978 and June 1980, ASRS received 22 reports of loss of aircraft control in flight. Though half of these involved small aircraft (less than 5,000 lb TOGW), several aircraft categories, including wide-body transports, were represented (table 1). Half of the incidents occurred during approach and landing (table 2). The occurrences were attributed to wake turbulence in about half the cases and to pilot technique in about one-quarter of the cases (table 3).

TABLE 1.– TYPES OF AIRCRAFT

Type	Reports
Small aircraft, <5,000 lb	11
Small transport, 5,000-14,500 lb	3
Large transport, 150,000-300,000 lb	5
Heavy transport, >300,000 lb	2
Wide-body transport, >300,000 lb	1

TABLE 2.– PHASES OF FLIGHT

Phase	Reports
Takeoff	1
Climb	2
Cruise	5
Descent	2
Approach	10
Landing	1
Not stated	1

TABLE 3.– CAUSES OF LOSS OF CONTROL

Attributed Cause	Reports
Wake turbulence	11
Pilot technique	5
Turbulence/shear	3
Prop/jetwash	2
Aircraft configuration	1

The seriousness of the occurrences varied from "controllability was momentarily in doubt" to severe loss of control with imminent hazard to the aircraft and its occupants. Examples of each are summarized here. The first was received from the pilot of a small aircraft, landing out of instrument meteorological conditions.

1. Aircraft B, a prop jet, was doing a full-power or near full-power runup on a heading of about 270° west of and adjacent to the touchdown zone of runway 36. I was completing an ILS approach when I encountered significant turbulence behind aircraft B, to the extent that full control of my aircraft was momentarily in doubt. The air was very smooth except behind aircraft B . . . .

* * *

This report came from the pilot of a wide-body aircraft.

2. While on final approach to runway 28R, an aircraft was cleared for takeoff same runway . . . at about 600 ft another aircraft (large transport, less than 300,000 lb) was also cleared for takeoff . . . at this point I alerted my crew for a

possible go-around. At 200–300 ft, I realized a go-around would compound the problem . . . due to the straight-ahead procedure and overtaking departure aircraft. I was all but committed to a landing. With the wind 290° at 12 knots, I increased approach and threshold speed slightly above normal for impending wake turbulence. Below 20 ft, I had a handful of airplane that required additional thrust for adequate control. The lateral displacement was very rapid and heavy . . . although landing was smooth, it was 500 ft beyond the normal touchdown point because of lift produced by wake turbulence. The other aircraft rotated as I was flaring. I commented to the controller that it was "Very tight." His reply: "It was legal." I was later told (by the tower chief), "Minimum separation for landing/departing traffic is 6,000 ft, and we had it." After what I felt at flare in a wide-body, I strongly suggest the separation be increased, especially where one's prerogative has been taken away by local procedures . . . . I will never permit myself to be placed in a position like this again . . . .

* * *

A much more serious occurrence was reported by the crew of a small piston-engine transport aircraft (this extract contains material from two reports).

3. During scheduled commuter operation from ABC to XYZ, wake turbulence was encountered on the ILS course. Flight 123 was turned on the localizer 2–3 miles from the final approach fix, given approach clearance and told to contact tower . . . While tracking the localizer inbound severe wake turbulence was encountered causing the aircraft to become completely inverted. Corrective action was taken and the plane rolled upright . . . . We immediately flew to the left of the localizer . . . and advised the tower of our action. We then broke out of the clouds and saw heavy-transport aircraft B ahead approximately 2-1/2–3 miles. He was at or above our altitude [and] eventually executed a missed approach. This occurrence could have been prevented had we known about the type traffic ahead and his distance . . . it was fortunate that the incident occurred at altitude and not near the surface . . . .

* * *

In several cases, a loss of control was pilot-induced, though this occurred for a variety of reasons. The following are examples of this category.

4. I allowed a newspaper photographer to install a camera and camera mount on the top wing of my homebuilt aircraft. The purpose of this operation was to gather in-flight photos. Shortly after takeoff . . . I noted some burbling and directional instability that had not been present on previous flights. Since the thing was inaccessible in flight, I was obligated to eventually land with it in place. It then seemed the prudent thing to do was climb to altitude and make a controllability check. This aircraft was never too gentle in the stall, and with the camera in place it rolled inverted at the first nibble, there being a distinct lack of rudder authority. Upon recovery and after collecting my thoughts, I realized that I had forgotten to note the speed at which the roll occurred. Since this value was essential to a successful landing, I repeated the procedure, this time with the camera turned on. The

result was the same; I noted the speed, got some spectacular pictures, and learned to never again allow such a device on my aircraft.

* * *

5. I was heading 285° when notified by ABC approach of an unknown aircraft. Looking to right I spotted a black high-wing aircraft finishing a loop . . . the aircraft went again into a loop and evidently lost control at the top, because when he came out he was facing me. I turned right and descended. While trying to pull the plane out of this attitude, I stalled and spun. Upon recovery I called Approach, and was vectored to an airport. Damage was a broken windshield.

* * *

6. IFR on top broken layer and VFR conditions below. After departure I lost vacuum pump. Continued on top with VFR below. Entered tops without gyros and flew on needle-ball and airspeed. Entered turbulence and lost 3,000 ft then climbed 2,000 and unable to follow instruments because of turbulence. I had informed each controller that I had no gyros . . . in rain and turbulence and rolled over and also exceeded red-line speed by 40 mph. Finally made ground contact and saw I was inverted. Rolled out straight and level at red-line plus 30 and requested a no-gyro approach in haze with 3–5 miles visibility. Landed at ABC – where aircraft is to be inspected for damage.

* * *

Pilot-induced loss of control was not limited to small or general aviation aircraft.

7. Over the end of the runway the aircraft started to settle rapidly. The first officer applied power; however, the aircraft struck the runway sharply. The aircraft was left-wing low. I grabbed the controls and kept the aircraft level and on the runway until it was no longer possible. The aircraft slid off the runway and stopped. The left main gear broke off on impact or very soon thereafter.

* * *

8. Number 3 generator went off the line and engineer called my attention to problem. First officer told me autopilot had kicked off. Aircraft was descending slowly and lost about 400 ft. I took control and stopped descent for a few seconds, [then] put autopilot back on. Aircraft pitched up abruptly to 30°–40° pitch and fully stalled. I recovered but lost 2,400 ft. Informed Center of problem and climbed back to 35,000 ft. Checked all systems and everything worked normally . . . aircraft stabilizer trim was at 10° aircraft nose-up when I started recovery after taking autopilot off. I have no explanation of how or why this incident occurred.

* * *

Some occurrences were difficult to categorize, as in the following case.

9. I was cleared for a low approach and encountered some form of wake turbulence . . . near the departure end of the runway I . . . began a climb on runway heading as noise abatement dictates no turns until 1,000 ft. Shortly after raising the nose . . . the aircraft rolled sharply to the left. As the wings passed through the vertical I glanced at the airspeed indicator which read 140 knots. At that point I completed the roll at about 1,000 ft. I received word that (FAA) was investigating the incident. I went voluntarily to explain my action . . . they advised me that a . . . violation would follow for conducting acrobatic flight in a control zone . . . .

* * *

Other reports provided considerable detail as to the exact cause of the problem.

10. Aircraft (a small transport) was returning from a training flight; instructor and two F/O trainees on board. Weather briefings indicated squall line activity in the area, but (we encountered) no significant turbulence until midpoint on the ILS. Previous aircraft had reported "moderate or possibly severe" wind shear on final . . . 20-mile downwind leg, intercepted glide slope at 2,800 ft, in and out of clouds, strong south wind requiring a 20° correction to the left. (At) approximately 1,600 ft MSL (600 AGL), strong updraft and north wind which pushed us south of centerline and off top of glide slope. With power at idle, airspeed increasing from 140 to 160 KIAS, nose slightly down, rate of climb [was] 700 FPM. Weather was very turbulent, control difficult, heavy rain, very dark. PIC attempted to keep from climbing further by maintaining idle power and forward controls. Downdraft encountered while in this condition. As aircraft went through 1,400–1,500 ft MSL F/O called 3,500 FPM rate of descent. PIC added full power, recovered above the trees just outside the airport boundary and slightly south of centerline. Altimeter read less than 100-ft AGL at bottom-out. Subsequent ILS and landing uneventful as cell moved northeast . . . .

* * *

11. We were on final approach for runway 34R (in a large transport aircraft) when we encountered wake turbulence at 200 ft AGL of such magnitude that momentary control of the aircraft was lost. Full power was applied instantly and recovery was made at approximately 50 ft AGL. We had made a stabilized 30° flap approach 5 miles in-trail of a wide-body cargo aircraft . . . . The unusual factor was that aircraft B flew an approach profile approximately 1,000 ft above the glide slope and initiated a go-around 800 ft above the approach end of the runway . . . the air was perfectly smooth until about 200 ft AGL when we were struck by a violent downdraft. In my opinion the aircraft actually quit flying . . . there was no stick shaker . . . upon recovery the aircraft was aligned with the runway and a normal landing was accomplished . . . .

* * *

12. Departure and weather attached. After-incident conclusion: aircraft flew into water-spout cell like going over waterfall in a canoe. [This was] an overwater flight that encountered turbulence and possibly a water spout during IMC flight over ocean. Instrument failure, some aircraft damage and loss of aircraft control occurred with uncontrolled dive until VMC below clouds where enough altitude existed to regain control.

Similar Sounding Alphanumerics

The diagnostic term "similar sounding A/N" is regularly applied to reports submitted to ASRS during their processing if their content indicates that a safety-related incident has involved misunderstanding arising from names or numbers that have been confused with other names or numbers. Using the term, retrieval of such reports from the ASRS data base is facilitated; opportunities for such misunderstandings are almost limitless, and it is obvious that they present a serious – and difficult-to-eradicate – hazard to safety of flight. Perhaps the most frequent example of this form of confusion occurs when one air carrier flight number is mistaken by a controller for another, or the corollary to this – when a flightcrew acts upon a clearance or instruction meant for another. Other manifestations of the problem involve runway numbers ("runway two zero" mistaken for "runway two"), altitudes (six thousand instead of one six thousand), vector headings mistaken for altitudes (heading 310° instead of flight level 310), and geographic names that sound like others when heard through headphones or radio speakers. The basic problem is often compounded by the read-back problem previously discussed in these quarterly reports (ref. 12).

The first two narratives in the following selection illustrate the heading/altitude problem graphically. In the first, the flightcrew, maintaining FL280, was expecting a climb and a vector to accord with the original plan. The second, from a controller, describes a not-untypical conflict from this sort of error.

1. Center cleared our aircraft to heading 310 for direct to fix. The first officer is new and was expecting the filed altitude of FL310. He initiated the climb. I called Center to verify a heading versus an altitude change. Center verified the heading and cleared the aircraft to FL310.

* * *

2. Aircraft A cleared to descend to FL280. Aircraft B cleared to climb to FL270. Aircraft A issued a heading of 240°. Pilot acknowledged with "Roger, 240" and took it as an altitude change instead of a heading. He descended through aircraft B's altitude. Neither aircraft took evasive action. Altitude was observed at 27,200. I questioned the pilot; he said I cleared him to FL240 and that he had acknowledged it. A full read-back by the pilot would have prevented the incident as his misunderstanding would have been noticed prior to descending below FL280.

* * *

Despite the potential for conflict implicit in the next report, it is reminiscent of a theatrical comic routine.

3. Flight A was an international nonstop under Center radar control in CAVU weather. The first officer was controlling the aircraft through the autopilot. Center's high-altitude sector issued, as understood by the captain and first officer, the following clearance: "Cleared to descend to two zero zero, cross two zero miles south of XXX at two two zero." Captain read back the clearance and first officer selected 20,000 on the altitude selector indicator. Flight was subsequently changed over to the next center. Initial contact from the flight to the center was: "Flight A leaving two two zero for two zero zero." The center's first response was: "Were you cleared to two zero zero?", or words to that effect. We advised that this was what the flightcrew had understood. Some time later Center told us that the previous center had advised that the clearance was only to FL220. At no time was the flight advised to maintain 220, which could have been accomplished easily, as the flight was in a rather shallow descent. Remainder of descent and landing was normal and uneventful. Misunderstanding – if in fact there was one – was probably precipitated by the use of too many "alike-sounding" numbers, given at one time. ATC sectors could be restructured so that the possibility of confusing numbers would be eliminated. When the second center received the transmission from the flight, which indicated a descent below what the center had as assigned altitude, it should have issued an immediate clearance for the flight to maintain two two zero. Such an assignment could have been accomplished immediately.

* * *

Names of geographic points or designated fixes that may (or may not) look quite different when printed can sometimes sound nearly alike when pronounced or heard on aviation radio equipment. Two narratives here show this trap.

4. On an instrument training flight, Approach Control asked us to give an estimate to WRAPS intersection. Before the student could work out the estimate, Approach gave us the following clearance: "Trainer Aircraft is cleared to the Modesto Airport via Victor 23 Grange, direct RAMPS (the Modesto outer marker), maintain 3,000 ft." Needless to say, the student mistook RAMPS for WRAPS and became thoroughly confused over the clearance.

* * *

5. A17 has two checkpoints: RESIN and AYSON. These two fixes are sometimes confused over the radio due to the pronunciation similarity.

An ASRS Alert Bulletin was issued to point out the RESIN-AYSON difficulty with the encouraging result that AYSON was changed to INDEE within a very short time. Of interest in the second of the similar-fix reports is the fact that RAMPS appears only on the instrument approach chart, while WRAPS appears only on the en route chart for the area. The student's confusion seems natural. Fix misidentification has appeared in Morse code form as well as in words.

6. I was cleared for an NDB runway 32 approach at Muncie. I tuned and retuned the SELLA LOM and had a positive audio identification on it. The ADF in the aircraft was the tunable type, not the type where you set the numbers in a

window. The ADF indicated that I was well to the right of course. I turned approximately 50° to the left, to which the ADF responded. After intercepting the inbound course, I heard the marker beacon (which I used as a final check) and commenced the approach. After breaking out and the approach time had elapsed, I saw the airport at 10:30, 3 miles away. I was incredulous at being so far off. Arriving at the airport, I noticed the runway was "30," not "32." I executed the missed approach, informed ATC of my problem, and was cleared for another approach (a VOR runway 32) into Muncie and landed without further incident. The problem was that I had misidentified the station (SELLA NDB). Instead, I was receiving VIDEO LOM at Anderson. The frequency difference is 6 MHz and the identifiers couldn't be closer: VIDEO is (. - . .); SELLA is (- - . .). With a tuning-type ADF the visual indication of station frequency is nil for reliability. I would have sworn that I heard SELLA but I did not. I flew the Muncie approach with the Anderson LOM.

* * *

The most frequently cited subdivision of the similar-sounding A/N category involves the transposition of an aircraft flight number or call sign to another aircraft. One flightcrew accepts another's clearance, or a controller gives an instruction meant for one aircraft to another. A short classic example leads off this group, followed by others typical of the type.

7. Aircraft A and aircraft B had similar call signs. Aircraft A took a clearance meant for B and reached B's altitude before B left same, descending as cleared.

* * *

8. Two of the same make of aircraft with the last three tail numbers similar were on radar vectors making an approach to runway 30. For several minutes vectors were being given without the controller or either aircraft being aware that another aircraft with the same three digit designation was on the same frequency. My own aircraft ended up well out to sea, having been on vectors that made little sense as part of the approach. Because of the heavy cloud cover and traffic, I assumed that the vectors were for separation and/or sequencing. I became aware that I was on a heading well away from the airport and at an increasing distance from it. At about the same time I began to question the vectors, the controller realized that there were, in fact, two aircraft with the same call signs under his control. At that point the problem was resolved, with each aircraft giving its full number . . . . Though my experience resulted only in inconvenience and some confusion, I am sufficiently concerned about the possibility of being in hard IFR with another aircraft of similar call sign that I have requested a change of my "N" number to one that I think is unlikely to be duplicated. Had my experience taken place at a low altitude or had I been in an area with mountains surrounding the field, serious difficulties could well have followed.

* * *

9. While we were calling in range on Company frequency, I thought I understood Center to clear us down to 4,000 ft so I started down. After the other pilot

finished talking to Company he asked what altitude we were cleared to and I said 4,000. He said he hadn't heard it because of the transmission from Company so we checked if the descent was for us. The controller said no, that it was for another aircraft at 6,000 ft that apparently had an ending call sign like ours. We had descended about 400 ft and asked if we should go back to 6,000. The controller said 5,000 would be fine. A normal approach and landing followed.

*   *   *

10. Received a call from Center advising that our 9,000-ft altitude would not be sufficient after fix, which we were aware of. They asked if we would like 11,000 or 13,000. We acknowledged that we would take 11,000. Controller said, I believe, "Aircraft ABC cleared to 11,000." We in turn replied, "Aircraft ABC is out of 9,000 for 11,000." Another aircraft, CBA, at the same time received a climb to 13,000. When I was at 10,200 Center called and asked if I was climbing. I replied that I was and Center said that he had not given me climb clearance. I replied that I thought that I had received it and that I had told him at least twice that I was climbing. I even discussed the situation with my copilot and we were in agreement. Controller did say no problem was caused, that we could continue to 11,000. Possibly the nearness of these two "N" numbers caused either me or the controller some confusion. I personally will be more diligent in the future.

*   *   *

11. Aircraft A was climbing to 11,000. Five miles behind aircraft A was aircraft B with similar identification at 12,000 and overtaking aircraft A. Aircraft B was issued climb to 17,000; aircraft A acknowledged for aircraft B and began to climb. Aircraft A was again told to maintain 11,000; his altitude readout at this time showed 11,700. Aircraft B saw aircraft A and advised that traffic was no factor. He climbed to 17,000. Subsequently aircraft A was climbed to FL190 and communications were transferred.

*   *   *

12. Upon arrival at departure end of runway 25R I heard Tower say, "Aircraft A, cross 25R, position and hold on 25L." Our flight was aircraft B. We then heard aircraft A receive takeoff clearance. Next transmission to us (I believe) was to "cross 25R, position and hold 25L." As we were taking position on 25L we heard another aircraft cleared to cross 25R and hold short of 25L. After about a 20-sec delay on the runway we heard Tower tell aircraft C to go around. We were then told by the tower, "You were advised to hold short of 25L." We stated that we understood we had been cleared on to 25L. Tower stated that we had read back aircraft A's clearance. Trip continued. Contributing factors: similar airline flight numbers, arrivals and departures on closely related parallel runways, misinterpretation of radio clearance, amount of traffic.

*   *   *

As with all other aspects of aviation, only constant attention to details – eternal vigilance – can overcome the traps in waiting. With the least complacency can come a new problem.

13. A flight of four fighters split up for recoveries for a PAR final. Copeck 2 departed the range first, followed 3 miles in trail by Copeck 1. Copeck 2 contacted Approach at 10,000 ft MSL and was given a heading of 070° and then 060°. Copeck 1 was given the same vectors. Copeck 2 was descended to 7,000 ft and the pilot observed the city airport passing off his right wing. The pilot started a right turn and Approach advised him to maintain heading 060. Copeck 2 replied, "Negative" and continued a right turn to 140°. Mountains rise abruptly to over 9,000 ft just 6 miles east of the extended PAR final approach course. In the meantime, Approach had given Copeck 1 turns to 120° and 160°. The controller issued these vectors believing the first aircraft was Copeck 1. After Copeck 2 refused the turns, the controller realized he had been giving vectors to the wrong aircraft. He reidentified the aircraft and issued new vectors and altitudes. Conclusion: Copeck 1 and Copeck 2 were misidentified by one sector controller during handoff to another sector. Instructions issued to Copeck 2 left him on a collision course with the mountains east of the final approach course.

* * *

14. When I got the handoff off on the aircraft it never dawned on me that he was on V187 instead of V187E . . . . Later Approach called and said, "Tower says aircraft is on V187, not V187E." I said, "Sorry" and hung up. The aircraft was all by itself and no other aircraft were involved.

* * *

15. After takeoff, aircraft A was instructed to turn to heading 070°. Shortly thereafter he was observed on a track of approximately 140°. He was asked his present heading to which he replied that he was turning to 170°. He was turned back left to heading 060° and subsequently climbed on course. There was no incident during these maneuvers, but there was a potential conflict with aircraft B, which was resolved by altitude assignment. However, it could have been very critical at a busier time of day . . . . This situation could have been prevented by more attention to duty in the cockpit of aircraft A, as tapes verified that heading 070° was issued and flightcrew read back "heading 070." Later, pilot stated that he and copilot both understood that a heading of 170° was issued. Hard to believe!

* * *

Finally, a pair of miscellaneous mishaps is presented to establish the wide variety of name-number incidents occurring. In the first of these, the pilot had called for clearance through an Air Traffic area.

16. Pilot called on what he thought was the local frequency for clearance through the ATA. He had, in fact, changed to a nearby airport's local frequency

(121.3) and was cleared through their ATA. He realized his mistake at the time of the occurrence and changed to the correct frequency (120.3).

* * *

17. When asking for a release, the controller stated, "You can hold him," and was misinterpreted as saying, "You can roll him." No evasive action was needed, as the pilot had the other aircraft in sight. A lack of communication was the main cause of the incident.

Incapacitation

Changes have taken place in air carrier training programs as the result of an excellent simulator study of incapacitation performed several years ago by United Air Lines. In that study, captains feigned incapacitation during final approaches in the course of proficiency training. It was found that it took considerable time for first officers to realize that the pilot flying was no longer "in the loop"; a substantial number of the flights resulted in "crashes."

The problem of recognizing, and responding to, a serious performance failure is a difficult one. No professional pilot takes over control from another lightly, especially if the incapacitated pilot is in command of the airplane. Yet there are clearly cases in which it is necessary to take positive action to maintain the necessary margin of safety.

Incapacitation, if obvious, poses no such problem. It is when incapacitation appears only in a performance defect or failure that it becomes a difficult problem to detect and to handle.

These extracts illustrate the capricious nature of failures of performance (Nos. 1 and 2) and the difficulties inherent in doing something about them when they occur in operational flying (Nos. 2 and 3). The first two examples are from occurrence reports submitted to the NASA Aviation Safety Reporting System; the third is an extract from an NTSB accident report. (Emphasis added in the narratives.)

1. *Report from first officer, scheduled operation:* . . . (We were) cleared to 2300 ft to intercept the approach course and cleared for the approach. Descent was being made by the captain with the power set at about 1.4 EPR and with the speed brake extended. Altitude callout was made by the first officer at 3300 ft. Descent continued through 2300 and another callout was made by the F/O at 2,100 and 1,800 ft, both times stating that we needed to be at 2300 and that we were low. The second officer made a similar callout at 1,700 ft. Descent continued to 1,500 ft with speed brake extended and power set. Approach Control called and stated that he showed our altitude to be 1,500 ft, that we were cleared to 2,300, and to correct.

During the descent the aircraft speed had deteriorated from approximately 230 knots to 190 knots . . . as altitude recovery was initiated at about 1,450 ft by pulling the nose up, the stick shaker activated. The F/O then called out "speed brake" with substantial volume as he was pushing forward on the yoke. The captain did not secure the speed brake but instead pulled back on the yoke again and added (power) . . . . This time the stick shaker was reactivated and the aircraft began to buffet. At this point, the F/O called out louder, secured the speed brake, and the buffet ceased along with the stick shaker . . . . Climb back to correct altitude was made . . . a reasonably normal landing was then completed.

At no time during this flight did the captain ever respond to any callouts or make (any) himself . . . the pilot is . . . competent but sometimes uses nonstandard (procedures). *This time (he) had a lapse in performance where he just couldn't seem to get it together.* Discussion on the ground was cut off; all approaches observed since have been more standard and stabilized (according to the book).

*   *   *

2. *Report from a first officer:* This lengthy report describes a series of serious altitude and flight-control deviations occurring within a period of several days' scheduled flying.

The captain was a man I had known for over 20 years. I suppose we had logged more than a thousand hours together. I considered him to be the finest pilot I had ever seen . . . my confidence in . . . his ability was unshakeable . . . .

Our trip was cleared to proceed directly to ABC and to cross Intersection at 10,000 ft. Center announced that we were overtaking the airplane ahead of us and requested that we make a 180° turn to the right for a delaying vector. Several minutes later we were cleared to make (another) 180° turn and to cross Intersection at 10,000 ft. After reading back the clearance, I noted a bank angle of 60° and a sink rate of 6,000 ft/min. I sang out, "Watch your bank angle." The captain acknowledged, "OK," but allowed the attitude to remain as it was . . . . I could not understand why he had found it necessary to make such a radical turn. I concluded that he was angry with the delay vector, and that it was the intemperate act of an angry man. I had never seen him behave like this before, but perhaps he was under personal stress I did not know of.

The remainder of the approach was normal and the touchdown was smooth. Passenger reaction was bad . . . I was embarassed. The captain made no comment. The remaining legs of the trip were flown without incident.

[On a subsequent day] We were flying from ABC to DEF with the captain at the controls. He held the airplane on course heading, even though we encountered a strong crosswind which should have been countered with at least 10° of drift correction. I told him several times that we were off course and made many comments about the strong west wind. He acknowledged all of my comments but made no corrections. Three times Center called and gave us vectors to get back on course.

The airport was VFR and we were cleared for a visual approach to cross Landmark at 3,900 ft or above. When I noted that our altitude was 3,700 ft prior to reaching Landmark, I said, "We are cleared to cross Landmark at 3,900"; he acknowledged, but the airplane continued to descend. When the airplane reached

3,500 ft, I said loudly that our altitude was 3,500, and we were supposed to cross Landmark at 3,900. He leveled off and we crossed Landmark at 3,500 ft.

[On a following segment] . . . I had often marveled at the way this man could put an airplane on the end of a runway so he had maximum runway for braking and stopping. I mention this because he now began a visual approach to runway XX below glide slope, and I assumed he was practicing his low approach. When we passed 500 ft, I began to comment that we were low. I continued to talk about how low we were until we reached 200 ft, and I began to yell, "We are too low." I noticed the rate of (sink) go to zero and we held our altitude, but the airspeed began to decay. I began to sing out airspeeds, and then I yelled, "We are at reference speed." He applied some power but not enough; the airspeed continued to decay, and my callouts became more frantic. The stick shaker began and he instantly applied more power. The airspeed increased and the touchdown was mooth. I was shaken; I thought I was going crazy. The greatest pilot I had ever known was flying like a student, and he didn't even seem concerned . . . (he) even made several comments to the effect that I was becoming overly critical.

[On the following day, during climb] . . . He maintained an airspeed of 150 knots through 10,000 ft and then allowed the airplane to accelerate to the proper speed for the next few minutes. We were cleared to our cruise altitude. After leaving 20,000 ft, we were IFR in clouds and some light chop when I noticed the airspeed begin to decay. It is not unusual to trade a little airspeed for altitude if you feel that an expedited climb will give a smoother ride, and I assumed that was what he was doing. The airspeed continued to decay until it reached the point where I found it necessary to comment. Because of his remarks about my being overly critical, I had reverted to the old military system of hand signals to alert him to his oversights, and I began to point to the airspeed. He turned and looked at me and said, "What are you pointing at?" I said, "My airspeed." He said, "Well, what about your airspeed?" I said, "It reads 200 knots." He said, "So what?" I said, "That's much too low." He said, "Oh," and pushed forward slightly on the wheel, and the airspeed began to increase; but several minutes later it was decaying again, and we could feel . . . the pre-stall burble . . . he looked at me and with a big smile on his face said, "Whatever do you think that is?" . . . He then, laughingly, put the autopilot on altitude hold and the airplane began to accelerate; the remainder of the trip was normal.

. . . I wondered whether he was testing me in some way. He seemed so unconcerned and disinterested that it was obvious he was not aware of any problems. On the ground and in the air his speech patterns were normal, and his pleasant, good humor was unchanged. I knew one thing for sure, I could not fly with this man again. I was a nervous wreck. I decided to tell my troubles to the office. The office requested a medical examination, and my longtime friend . . . was found to have a brain tumor . . . .

In conclusion, with the whole series of events placed together, it is easy to diagnose illness as the cause; *but when these incidents come one at a time, covered with a blanket of perfectly normal behavior before and after each incident, it is very* *deceiving.* Had I been flying with anyone else, I certainly would have been a great deal more aggressive in demanding correction. I should have taken the airplane on the low approach at 500 ft, but don't forget that this man had been my friend for over 20 years – and confidence like that is very hard to shake.

*   *   *

3. *Narrative and Conclusions from NTSB Accident Report AAR-80-1:* . . . The captain was a company vice president with over 20,000 hours who was known to rarely acknowledge checklist items or other callouts from any first officer. The first officer, although previously qualified in the DHC-6, had only been with the company for 2 months. For the first year, pilots are on probation, are not represented by the pilots' union, and may be terminated with or without cause.

It was within this environment that the first officer's role in this accident must be evaluated. The first officer testified that he made all of the required callouts except the "no contact" call and that the captain did not acknowledge any of his calls. Because the captain rarely acknowledged calls, even (deviation) calls . . . this lack of response probably would not have alerted the first officer to any physiologic incapacitation of the captain. However, the first officer should have been concerned by the aircraft's steep glidepath, excessive descent rate, and high airspeed. These three factors limited the amount of time available to the first officer to react once Flight 248 descended through the decision height.

The poor altitude and pitch control exhibited by the captain and the steep descent rate that the aircraft achieved should have alerted the first officer to the existence of an abnormal situation. However, a flight simulator study of subtle incapacitation conducted by United Air Lines demonstrated that recognition of the phenomenon by the other crewmember is a difficult task. In the United simulator study, when the captain feigned subtle incapacitation while flying the aircraft during an approach, 25 percent of the aircraft hit the "ground." The study also showed a significant reluctance of the first officer to take control of the aircraft. It required between 30 sec and 4 min for the other crewmember to recognize the captain was incapacitated and to correct the situation. The first officer of Flight 248 had 1 min 9 sec from the outer marker to impact. It is quite possible that the first officer also was suffering from fatigue which dulled his senses and reactions.

If Flight 248 was descending at 1,488 ft/min, it would have descended from the decision height to impact in about 6 sec and from 100 ft below decision height to impact in about 2 sec. The short time available from decision height to impact, coupled with the usual nonresponsiveness of the captain to callouts, made it extremely difficult, if not impossible, for the first officer to detect a deteriorating situation and react once he called decision height and verified that no approach lights were visible . . . .

Conclusions: . . . The aircraft was 220 ft high at the outer marker. The distance from the aircraft's last plotted position to impact was 1.29 n. mi. From the aircraft's last plotted position to impact, the aircraft descended at 120 knots ground speed with a descent rate of 1,488 ft/min and a descent angle of 6.976°. The aircraft descended from the decision height (250 ft) to impact in 6 sec.

The captain was almost 61 years old, a company vice president, and a part-time line pilot for 14 CFR 135 operations only. The first officer had been with the company only 2 months. The captain may have lacked proficiency in the DHC-6, as he had flown only 12 hr in the 90 days preceding the day of the accident. The captain's lack of recent flying time in instrument meteorological conditions may have resulted in deteriorated instrument flying proficiency.

The captain had developed hypertension while in military service. Both his military and FAA medical records reflect the existence of hypertensive cardiovascular disease. The captain's FAA medical records indicate nonspecific electrocardiogram changes, abnormal blood chemistry, and occasional elevated fasting blood sugar. The captain's autopsy findings revealed a well-healed myocardial infarct and a 40 to 70% occluded left anterior coronary artery. The captain was taking polythiazide, a hypertensive medication, and allopurinal, a gout medication. The captain listed no medications on his most recent FAA medical application form; however, his military medical records indicate the use of these drugs. Both drugs can be waivered by FAA AME's if the use of the drugs is known. The captain's only known food intake occurred in the late afternoon between flights.

The Hyannis weather was near approach minimums, which forced the flightcrew to fly the ILS and significantly increased the crew's workload. The crew had worked a 14-hr duty day involving 9 hr 15 min of flight time. The captain was outwardly upset when ordered to undertake additional flights at the conclusion of his anticipated workday.

The probability of the first officer recognizing and reacting to any possible physiologic incapacitation in the captain was remote . . . .

THE GO-AROUND MANEUVER IN AIR CARRIER OPERATIONS: CAUSES AND RESULTING PROBLEMS

W. P. Monan*

A go-around maneuver is neither difficult nor demanding; in pilot jargon, it is a "no sweat" procedure. The typical flightcrew reaction to go-around is annoyance at the waste of fuel, time, and effort in pulling out of the approach and a semicynical expectation of long vectors, delay, even holding, prior to resequencing into the pattern.

However, when placed into the context of the near midair collision risk picture, go-arounds, as reported to the Aviation Safety Reporting System (ASRS), are frequently avoidance or evasive maneuvers in breakouts from traffic conflicts. Furthermore, these pullouts from approach often channel the aircraft immediately and precipitously into conflicts with other aircraft in the airport traffic area. With respect to conflicts, a go-around can be a transition phase – from the frying pan into the fire.

One hundred ninety-four go-around occurrences involving air carrier scheduled flights were reported to the ASRS during the period from May 1, 1976 through July 30, 1979 (39 months). As shown in table 4, 102 of these maneuvers occurred in TCA airspace, and 92 were distributed almost equally between TRSA and non-Stage III airport operations.

TABLE 4.– GO-AROUNDS ASSOCIATED WITH AIR CARRIER OPERATIONS IN VARIOUS TERMINAL AIRSPACE CATEGORIES

	Conflicts	Nonconflicts	Unknown causes	Totals	Percent of total events
TCA terminal areas	80	18	4	102	53
TRSA terminal areas	40	8	0	48	25
Non-Stage III areas,					
Tower controlled airports	20	6	0	26	13
Uncontrolled airports	15	3	0	18	9
Totals	155	35	4	194	100

Traffic conflicts with other aircraft, either converging during the approach or situated on the landing runway, directly caused 155 go-arounds, (80%); table 5 shows their distribution. Twenty-three of these conflicts were near midair collisions (NMAC). Thirty-five of the maneuvers (18%) were reportedly caused by nonconflict operational problems, such as bounced landings, crosswinds, wake turbulence, too high and too fast, and line-up with wrong parallel runway. Four go-arounds – all in TCA airspace – had no stated causes.

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TABLE 5.– CONFLICT SITUATIONS AND NMAC'S IN VARIOUS CATEGORIES OF TERMINAL AIRSPACE

Areas	Conflicts	NMAC's	Totals	Percent
TCA terminal areas	71	9	80	51
TRSA terminal areas	36	4	40	26
Non-Stage III areas,				
Tower-controlled airports	12	7	19	13
Nontower-controlled airports	13	3	16	10
Totals	132	23	155	100

Examination of the report narratives showed that airmen and controllers were exceedingly loose in the descriptive terminology they applied to the maneuver; for example, "pull-out," "go-around," "abandoned approach," "aborted landing," "discontinued approach," "missed approach," "wave-off," "overshoot," appeared indiscriminately. However, only those pullouts from final approach accomplished in VMC conditions were tallied as go-arounds in this study. Missed approaches resulting from "no visual contact" at decision height (DH) or at minimum descent altitude (MDA) displayed considerably different operational and human factors than go-arounds; they were eliminated from this analysis.

Initiating go-around maneuvers did not always resolve the conflicts. Subsequent midair conflicts frequently occurred. Review of the narratives disclosed that one-third of the 155 conflict-generated go-arounds sequenced immediately into additional midair conflicts, of which 18 could be classified as near midair collisions (table 6).

TABLE 6.– MIDAIR CONFLICTS PRECIPITATED BY EXECUTION OF GO-AROUNDS

Airspace category	Conflicts	Near midairs	Total
TCA airspace	14	12	26
TRSA airspace	9	4	13
Non-Stage III airspace:			
Tower-controlled airports	7	2	9
Nontower-controlled airports	2	0	2
Totals	32	18	50

The number of conflicts occurring in the go-around phase suggested the possibility that in VMC weather conditions ATC controllers were work- and habit-conditioned to expect the continuation of an air carrier approach into a completed landing. Unexpected go-arounds sometimes resulted in hasty, unplanned, or incompleted coordination reactions.

> I watched on radar as an air carrier on a go-around merged with another aircraft that was departing off runway 04. Apparently no separation was being exercised. Then they dumped them both on to my frequency; both pilots were somewhat mad, to say the least.

* * *

> We were advised we were overtaking traffic and told to climb out to 3,000 ft. At 1,800 ft, we broke out of some rain showers, found ourselves head-on with another aircraft at our twelve o'clock position. I feel no provision was made for a go-around in the controller traffic picture.

> At approximately 600 ft the captain spotted the aircraft on the go-around. He was about 500 to 600 ft away and converging on us. We leveled off and then noted the other aircraft make an abrupt upward pitch change indicating they had seen us. They then passed over us.

Causal Factors in Conflict-Generated Go-Arounds

Since go-around maneuvers happen fast, at low altitude, and within the close confines of the terminal area, the cause-and-effect relationships that triggered the physical conflict situations were invariably direct, rapid moving, almost domino-style in the immediacy of their effect.

The causal factors that directed or permitted movement of one aircraft into the projected flightpath of another on final approach could be divided into two broad classifications:

1. Human behavioral failures, by airmen or ATC controllers, usually stated objectively in the reports as errors, omissions, or coordination breakdowns.

2. The coincidental presence of operational situations or flight activities involving adjoining parallel runways, airspeed performance mix, training aircraft on opposite-direction practice instrument approaches, pilot use of back-course ILS localizer approach, nearby peripheral airports, and other secondary environmental conditions.

These operational variables represented happenstances that did not directly cause the conflicts by their presence or action, but linked coincidentally into the chain of causal events which precede every aviation accident or serious incident.

In some reports (usually self-admitted revelations of error), airmen and controllers touched upon sensitive, subjective human factors, which tended to explain the factual details of the mistakes. These psychological and physiological factors included distractions, worry, workload, aggression, schedule pressure, anger, inexperience, even the pressing requirement for restroom facilities. These forces sometimes could be defined as the root causes of behavioral failures.

> I kept making mistakes all day. I couldn't keep my mind on the traffic. I asked the supervisor for relief but he said he couldn't spare me. It was a boy! 8 pounds 3 ounces!

Analysis of primary causal factors– The physical conflict situations that were the immediate causes of most of the go-arounds (155) were classified into in-flight and on-the-ground operational phases, according to ATC airspace configuration. The distribution of these by airspace is shown in table 7.

TABLE 7.– CONFLICT-GENERATED GO-AROUNDS CLASSIFIED BY FLIGHT PHASE AND AIRSPACE CONFIGURATIONS

Conflict situations	Airspace				
	TCA	TRSA	Non-Stage III		Total
			Tower	Nontower	
In-flight convergence	29	25	12	8	74
Aircraft "on the runway"	51	15	8	7	81
Totals	80	40	20	15	155

In-flight occurrences– Review of the in-flight occurrences indicated close associations with physical runway layouts and various flight activities. These subdivided into more specific categories in table 8.

TABLE 8.– IN-FLIGHT CONFLICT SITUATIONS

Type of operation	Airspace				
	TCA	TRSA	Non-Stage III		Total
			Tower	Nontower	
Parallel runway operations	7	4	2	0	13
Intersecting runway operations	7	6	1	1	15
Single runway; overtaking in trail or converging in approach	13	10	5	1	29
VFR traffic in approach lane	1	2	2	4	9
Opposite direction traffic	1	3	2	2	8
Totals	29	25	12	8	74

All parallel runway in-flight conflicts were a result of airmen misperceptions or misunderstandings.

> On final, I told the first officer to go to the right. Then I realized I had made a mistake. We were lined up with the wrong runway. At this time I discovered we had come close to another air carrier on approach to the parallel runway.

*   *   *

> After turning final, air carrier aligned himself with the right runway instead of the left parallel. This placed him directly in front of another aircraft. Evasive action was taken by instructing the air carrier to go-around.

*   *   *

We were on ILS for 9L. The foreign airliner overshot the 9R ILS course and went over the top of us. Then he crossed back over the top of us again as he corrected back to the localizer. We dived below the glide slope and pulled out.

The overtaking in-trail and approach cutoff conflicts during single runway operation (74 total) frequently reflected controller spacing problems in expediting heavy traffic.

I knew that it would be close. I was trying to get out as many departures as possible. I had 10 aircraft ready to go with more coming.

* * *

A mile out, we saw an airplane in position for takeoff. Later, the tower supervisor told me the controller was only trying to move traffic and he couldn't fault him for that.

* * *

The pressures of traffic sometimes induced controllers to "squeeze in" a visual approach between two arrivals. Usually, this aircraft was a small slower plane sequenced ahead of a faster air carrier transport. The attempted integration of mixed performance aircraft often set up an overtaking situation that resulted in a go-around.

This tower will tell you your sequence number and then keep slipping light aircraft into the pattern. Three miles out Tower said we were overtaking another aircraft. The pilot then said he had us in sight. I thought he might be under us so I executed a go-around.

* * *

Told to contact Tower at the outer marker and that a light twin was being positioned in front of us. No visual contact made. We contacted Tower; he said the twin was ahead of us and we were faster. When the twin reported short final we were sent around.

The coincidences of parallel runway operations and the mix of slow and fast aircraft linked into these TCA approach conflicts.

Cleared visual approach to the right runway. We were on localizer and on glide slope just inside the outer marker when my copilot took over, made a pullup and turn to miss a light aircraft that had been previously cleared to land on the left runway.

* * *

At approximately 300 ft we put on our landing lights and saw a small plane ahead, very close, on approach to the same runway. The copilot was flying. I yelled "don't pull up, you'll hit him! Go under!!" We put full power on the aircraft and went underneath him and then pulled out.

* * *

Although the air carrier was instructed to follow me, he overtook me on final. I was about 15 ft above the runway when the tower advised me to go around.

During initial analysis of the overtaking conflicts during the approach phase, the enabling factors in the occurrences appeared to be simple and uncomplicated controller misjudgments in spacing traffic flow.

However, upon closer study of the in-trail overtakings in all categories of terminal airspace, it became obvious that an independent and more significant factor was present in the potential conflict situations: the attempted integration of slower aircraft, usually prop-type equipment, into the approach sequences of faster, usually jet-type, aircraft. This airspeed mix was a primary element. Routine controller action aligned the incompatible mix of aircraft into the single file procession that precipitated the overtaking conflict.

It was determined, therefore, that go-arounds revealed in an indirect fashion the latent hazard potential in airspeed performance differences during operations in terminal airspace.

Ground occurrences– Table 9 summarizes aircraft-on-the-runway conflict events. These were correlated statistically with runway layouts and human behavioral factors. Aircraft caught in a "position and hold" situation on the runway were more frequently reported, especially in heavy TCA traffic operations. Controller plans that did not work out often resulted in what might be termed the classic active runway conflict: one aircraft cleared for takeoff but unable or unwilling to initiate the takeoff run due to a second aircraft still on his landing or takeoff roll with a third aircraft close in and cleared to land.

TABLE 9.– AIRCRAFT-ON-THE-RUNWAY CONFLICT EVENTS

Type of operation	Airspace				
	TCA	TRSA	Non-Stage III		Total
			Tower	Nontower	
Parallel runway operations	7	2	1	0	10
Intersecting runway operations	6	2	1	2	11
Single runway operations – controller spacing coordinations/judgments	18	6	3	0	27
Pilot techniques/misperceptions	7	0	0	4	11
Aircraft situations: Aircraft on takeoff run or landing roll with Aircraft unable to takeoff Aircraft on close final	8	3	1	0	12
Taxiing on or across active	5	2	2	1	10
Totals	51	15	8	7	81

> We were cleared for immediate takeoff. I replied we would not start our takeoff until the runway was clear. The controller then became very insistent that we start our roll. I again refused. The airliner on approach was forced to go-around.

Controller misjudgments of spacing did not always cause the conflicting occupancy of the active runway. Ten go-arounds were due to pilots missing turnoffs, exiting the runway slowly, or initiating the takeoff run late.

> The pilot replied "Okay, we're rolling." But he did not roll immediately.
>
> * * *
>
> I asked the air carrier if he was on the roll yet. He said "I'm all powered up and passing the last VASI now.
>
> * * *
>
> I don't understand why it took 2-1/2 to 3 min for him to start his takeoff after I cleared him to go. This delay resulted in a very nerve-wracking incident.

As in the midair conflicts, parallel runway mixups during ground operations often resulted in go-arounds.

> The foreign-registered aircraft was cleared to taxi to runway 11R. Instead, he drove on to 11L and then stayed on the runway. He spoke very little English . . . .
>
> * * *
>
> The tower issued instructions which I understood to be "Cross the runway!" As I taxiied across, I heard the tower giving hurried instructions for a jet to go around.

Eight of the 10 parallel runway on-the-ground incidents were attributed to airman misinterpretation of clearances.

Overall, in the 155 go-arounds, controller actions precipitated 72 and airmen actions caused 82 (one incident gave no causal details). Fifteen of the pilot-at-fault incidents occurred at airports without towers.

Published missed-approach procedure problems– A significant finding in the review of air carrier go-arounds was this: the abrupt and belated recognition by many airmen that the published missed-approach procedures often could not be adhered to and were sometimes potentially hazardous when a VMC go-around became necessary.

ASRS go-around reports support the view that published missed-approach climbouts (MAPS) were designed for use during full IFR operations. They did not necessarily accommodate VMC traffic conditions. Recognition of an imminent conflict predicament always occurred during the initiation of or in the decisionmaking for a go-around. As the aircraft trajectory changed, or was about to be changed, airman attention shifted to traffic flow movements that, up to that particular moment, had been nonessential information for the approach.

For example, go-arounds started during simultaneous parallel runway operations occasionally precipitated the abrupt realization that the published missed-approach climbout path directly overlaid the departure track of aircraft lifting off almost beneath the go-around.

> Aircraft were departing on the left runway with arrival aircraft coming in on the right parallel runway.
>
> * * *
>
> We had a minor control problem and advised the tower we were executing a missed approach. As we started to climb, (I'd hate to call it panic) there was what I'll call severe concern on the part of the controller as he repeatedly called for a departing jet to abort his takeoff. It was at that moment that the "big picture" became apparent and I realized I was going to write you folks another letter.

On many approach plates, the back-course ILS missed-approach procedure prescribes a straight-ahead climbout directly to the outer marker. A back-course ILS localizer approach may appear to be a routine, timesaving maneuver until a potential or actual go-around brings realization that the procedure mandates a climb head-on into front-course traffic flow.

> If we followed the patterned procedure for the back course we would have been in a very dangerous situation, because it called for straight-ahead path to OM. The MAP obviously never had this situation in mind. As I realized the situation, I broke off to the left and advised Tower what I was doing. He seemed confused. He told me to make a right turn, which would have placed us head-on to the opposite traffic.

In several back-course reports to the ASRS, an unimportant cloud cover, trivial in the approach operation, suddenly became more threatening than a thunderhead when the go-around pilot realized that he would be heading into clouds concealing the front-course ILS traffic.

An abrupt, unilateral pilot decision not to follow the MAP procedure can be equally hazardous. In one air carrier occurrence a quick 180° turnout of a high, fast approach placed the airliner nose-to-nose with an inbound aircraft in the adjoining approach lane.

There was substantial evidence in ASRS reports that cockpit planning for possible VMC go-arounds should envision specific traffic conflict contingencies that were neither contemplated nor designed in published IFR missed-approach procedures.

Analysis of human factors in go-arounds– Incidents in which movement of an aircraft into the projected path of another airplane on final approach resulted in a go-around were initially catalogued in association with airport runway layouts and other pertinent operational circumstances. Human factors, as secondary circumstances, often surfaced in these report narratives. There appeared to be some variation in the patterns of human factor associations among different types of terminal airspace and operational patterns.

TCA terminal airspace: The largest number of reports of go-arounds associated with conflicts during air carrier operations was from TCA terminal airspace. There were 80, of which 29 occurred in the air, and 51 took place on the active runway. Table 10 shows the distribution of these go-around occurrences by cause and runway layout.

Parallel runway layouts appeared to be a particular "pilot trap" with 13 of 14 TCA incidents attributed to airman confusion in the runways. Intersecting runways often displayed the latent hazard potential of light aircraft crossing the takeoff/landing runway being used by heavy jet air carriers.

In addition to the tabulated operating conditions, the condition "runway change in progress," though seldom given much attention in studies of conflicts, appeared as a significant contributor of go-around conflicts. Switching the active runways not only led to approach/climb encounters but sometimes set up hazardous head-on situations. The first operation on the "new" runway sometimes found itself pointed at the last operation on the "old" runway. This ATC operational procedure was especially critical at busy and congested TCA airports.

> Runway change in progress. I was the local controller working the two runways. When the air carrier – the first aircraft on approach to the changed runway – was inside the outer marker, I started calling him to issue missed-approach instructions. No answer. He finally called on short final stating he was executing a go-around. There was a possibility of a collision if the air carrier had not seen the other aircraft taking off on the other runway. Visibility was only 1/2 mile in rain and fog.

* * *

> We were approximately 7 DME out of 3,000 ft when we were cleared for the ILS 27R and told to contact the tower. It was at this moment that we spotted a small aircraft at our altitude, opposite direction, heading straight for us. We instituted an immediate steep turn to avoid collision. In a subsequent phone conversation with the tower I was told that runway 14 had been in use but just prior to our arriving, operations had been changed to runway 28. Although the change in runways indicated a change in traffic flow, ATC had allowed a VFR departure to take off in the previous traffic flow direction.

* * *

> We were just changing runway configurations as I relieved on the local control position. I told the controller I had the picture and assumed the position. The next transmission I received was from an air taxi "In position and hold," wanting to know what the lights were coming at him down the runway.

One of the objectives of this go-around study was to search for correlations of human factors with coincidental operational circumstances that resulted in conflicts. Many reports offered no leads for determination of the subjective causes for the incidents. Other narratives did supply descriptive details that yielded some insight into the elusive "why" of human error. A selection of 12 occurrence reports is presented in table 11. The report narratives are broken up, in this table, to

TABLE 10.– GO-AROUND CAUSES: HUMAN FACTOR ELEMENTS ASSOCIATED WITH RUNWAY LAYOUTS AT TCA AIRPORTS

In-flight events		On-runway events	
Error/cause	Number	Error/cause	Number
Parallel runway operations			
Pilot lined up approach to wrong runway	4	Pilot entered or aligned wrong runway	6
New first officer distractions (2)		Controller issued wrong clearance	1
Tuned in wrong ILS frequency (1)		Total	7
Sun glare (1)			
Pilot overshot localizer course	2		
Airshow in progress	1		
Total	7		
Intersecting runway operations			
Vectoring too close to final	1	Controller judgment of spacing	4
Racing: aircraft on ILS flight check	1	Pilot did not enter as instructed	1
Pilot mixup of runways	1	Pilot discretion	1
Pilot misidentification of traffic	1	Total	6
Emergency return	1		
Pilot spacing judgment	1		
Not stated	1		
Total	7		
Single runway operations			
Intrafacility coordination	9	Intrafacility coordination	18
VFR traffic in approach lane	1	Position and hold (8)	
Pilot discretion about wake turbulence	2	Aircraft on takeoff run (2)	
Wrong traffic sighted	1	Aircraft on landing roll (2)	
Sun glare	1	Runway change in progress (4)	
Undetermined	1	Back-course ILS in use (2)	
Total	15	Three-aircraft situation	8
		Controller spacing (3)	
		Pilot slow to exit (5)	
		Pilot slow starting takeoff run	5
		Icy runways (2)	
		Unknown (3)	
		Pilot slow to exit after landing	2
		Gear problem (1)	
		Unknown (1)	
		Taxiing on/across active runway	5
		Intrafacility coordination (4)	
		Pilot misunderstanding (1)	
		Total	38

TABLE 11.– CORRELATION OF HUMAN FACTORS WITH OPERATIONAL CIRCUMSTANCES IN TCA GO-AROUND OCCURRENCES

Action	Conflict	Human factor
On final approach I told the first officer to go to the right. Then I realized I had made a mistake. We were lined up for the wrong runway.	At this time I discovered we had come close to another air carrier on approach to the parallel runway.	I was busy inside the cockpit directing a first officer who was on his second trip.
We were cleared for the ILS to 27R.	A break occurred in the clouds. I glanced left and saw another air carrier about 200 to 300 ft away and closing.	Later, we were told a training flight had been cleared for an ILS to 27L but instead had tuned in the 27R frequency.
First officer flying, captain communicating. The F/O should have tuned in the ILS, instead he was still on the VOR.	None	He was inexperienced in the right seat, having just completed 9 years at the flight engineer position.
During ILS approach flag alarms on both G.S. indicators. We executed a go-around.	I was asked why we delayed advising the tower about our go-around since there had been a potential conflict with a simultaneous takeoff on parallel runway.	I had always thought that approach/landing airspace was completely protected for all operations including the ever present contingency of a go-around.
We were cleared to cross 25R and hold in position 25L. The first officer asked the tower "Into position, right?" The tower then replied "Into position, 25, right."	This caused an air carrier on final to 25R to abandon his approach.	The tower and crew both agreed it was bad verbiage. (Controller) I was on the last work hour of the last day of the week.
First officer flying the approach went through the localizer. Soon afterward, approach control requested climbout and another approach.	None	Fatigue may have been a factor. We had made 11 landings in the past 24 hr.
We were cleared to cross the active with an air carrier on landing approach.	As we cleared, I saw the airliner at about 100 ft retract his gear and go around.	We were in a "heavy" and it took a lot of power and time to get it moving.
Air carrier cleared to land.	Landing aircraft still on the runway, go-around initiated.	When I asked about it, I was told tower controller training was going on.
We were cleared to land when we had another aircraft ask the tower what our speed was. We replied 138K, and he said he was at 140K. We understood that the other aircraft was intending a low pass out of an ILS check.	At 600 ft, it was evident that we were on a possible collision course where the two runways intersect. I told the tower it did not look good, that one of us would have to go around. The tower then told the check flight to abandon his approach.	The ILS flight check pilot said over the radio: "Maybe we can beat him (the air carrier) to the field."

TABLE 11.– CONCLUDED.

Action	Conflict	Human factor
I thought I heard a transponder code and "cleared for immediate takeoff."	I set the squawk and pushed the throttles up. After beginning the roll I heard the roar of engines which later proved to be the traffic going around.	I should not have let the controller's clearance for an immediate takeoff pressure me to roll.
Less than 2 miles out on final the tower cleared another aircraft for takeoff.	The air carrier was just turning onto the icy approach end of the runway when we executed a go-around.	The controller seemed amazed that I should question his judgment. Apparently some controllers are unaware of the extra time it takes to taxi an aircraft on icy runways.
Weather was more than adequate for a back-course approach.	A mile out we saw an airplane in position for takeoff.	Later, the supervisor told us that the tower operator was only trying to move traffic and he couldn't fault him for that.

isolate the human factor component of each narrative and to correlate it with the other salient aspects of the occurrence.

TRSA terminal airspace: The number of conflict-generated go-arounds (40) associated with air carrier operations in TRSA airspace was exactly half of the TCA conflict count. Table 12 shows the distribution of these go-arounds. The on-the-ground runway incidents were considerably fewer in number than in the case of TCA's, suggesting reduced pressures of traffic flow. The three reported runway mixups, with the "position and hold" aircraft unable to take off, were all charged by controllers to pilot delay.

Aircraft on practice instrument approaches were a significant factor in TRSA go-around statistics. Eight incidents were associated directly or indirectly with this training activity. Touch-and-go practice contributed to three additional go-arounds. Additionally, the sighting of opposite direction practice approach aircraft head-on to the approach aircraft occasioned other airman reports which expressed concern about potential collision hazards if go-arounds had been attempted.

As noted in TCA operations, there was considerable evidence that suggested that TRSA airport procedures involved an implicit assumption that air carriers would not execute go-arounds. Intersecting runway spacings of departures and arrivals, simultaneous releases of takeoffs with landings on an adjacent parallel runway, clearances permitting opposite-direction flow, landing clearances to stop prior to crossing active intersection – these practices suggest that controllers operated on the basis of a broad assumption that no go-arounds would be made.

> Our scheduled flight was cleared to land runway 02 with a light aircraft executing a practice low approach to runway 20. He was sighted over the departure end of the runway at approximately 400 ft.

TABLE 12.– GO-AROUND CAUSES: HUMAN FACTOR ELEMENTS ASSOCIATED WITH RUNWAY LAYOUTS AT TRSA AIRPORTS

In-flight events		On-runway events	
Error/cause	Number	Error/cause	Number
Parallel runway operations			
Pilot lined up approach on wrong runway	4	Pilot misunderstood	2
Similar flight number (1)		Language problem (1)	
Pilot training activity (1)		Unfamiliarity (1)	
Pilot misperception (2)		Total	2
Total	4		
Intersecting runway operations			
Controller spacing	4	Controller spacing	2
Spacing errors (3)		Spacing error (1)	
Military aircraft on takeoff not on tower frequency (1)		Inexperience (1)	
		Total	2
Pilot overshot intersective on landing	2		
Total	6		
Single runway operations			
Failure to see and avoid traffic	4	Three-aircraft situation	3
Pilot identified wrong traffic (1)		Pilot delayed takeoff (1)	
No sighting of converging traffic (1)		Pilot slow to exit (1)	
Unknown traffic in approach lane (2)		Pilot overshot turnoff (1)	
Unauthorized traffic in ATA	1	Controller judgment of spacing	6
Pilot racing to runway (1)		"Position-and-hold" error (2)	
Too close in trail	7	Aircraft on takeoff run (4)	
Pilot training (2)		Aircraft taxiing on/across active runway	2
Pilot discretion (1)		Briefing relief controller error (1)	
Controller judgment/coordination (4)		Pilot misunderstood clearance (1)	
Opposite direction traffic	3	Total	11
Practice instrument approach (1)			
Controller training (1)			
Controller judgment (1)			
Total	15		

We had a 30-knot crosswind with higher gusts. If we had gone around, initiating a go-around with traffic at twelve o'clock at low altitude had possibilities of a midair.

We had assumed the tower was going to break off his approach but he did not do so.

Controllers have been conditioned to expect an air carrier to always land, especially in good weather.

One TRSA go-around conflict also displayed the hazard potential in the current military fighter practice of changing frequency to departure control prior to takeoff. In one military/air carrier mix, an unexpected pullout from an approach to an intersecting runway was executed with the local controller unable to communicate abort instructions to the fighters already on the roll. Human factor elements associated with airport runway layouts were revealed in various TRSA episodes.

In a few conflict-into-conflict incidents, an air carrier was forced into consecutive go-arounds.

> A light aircraft on base was told to keep his speed up, as an air carrier was following him. The air carrier was too fast, was overtaking, and was sent around. When he went around, he made a 360° turn back into final and conflicted with another light aircraft on final. These airplanes were very close. They came almost side by side, with the light aircraft perhaps 200 ft ahead of the air carrier. The air carrier pilot said later he never saw the small aircraft. The light aircraft was turned out and the air carrier went around again.

Training aircraft activities were coincidental operations in TRSA terminal airspace that sometimes interfered with the approach phase and, at other times, confronted the go-around airplane in the climbout.

> The first officer was flying and concentrating on the go-around. As I reached over to raise the gear I saw a small airplane in the center of my windshield. I used both hands to push forward on the yoke. The nose dropped and we passed under the light aircraft. The controller then gave us a left turn but I told the copilot to hold our heading. Later I was told that the twin was on a practice back-course approach.

Other training/air carrier mix reports did not narrate actual conflicts and these submissions were not included in the go-around citations given here. However, although "go-around thrust" was not ordered, the conflict potentialities of the situation disturbed several reporting airmen.

> Had we gone around, there was a practice ILS aircraft in our go-around path.

* * *

> A light aircraft was executing a practice low approach from the opposite direction. If we had been forced to make a go-around, a midair would have been quite possible.

A further selection of the TRSA go-around reports is shown in table 13. These reports have been arranged in a manner similar to that shown in table 11 in order to associate the human factors in the occurrences with the other salient aspects.

Non-Stage III terminal airspace: Twenty midair and 15 on-the-runway conflicts were reported as the primary causes for go-arounds associated with air carrier operations at non-Stage III airports. Table 14 shows the distribution of these reports.

Since many of these incidents occurred at fields without towers or Unicom, the reports had causal elements that varied considerably from those causes indicated in TCA and TRSA controlled

TABLE 13.– CORRELATION OF HUMAN FACTORS WITH OPERATIONAL CIRCUMSTANCES IN TRSA GO-AROUND OCCURRENCES

Action	Conflict	Human factor
On downwind we were asked if we saw our traffic. We replied affirmative and were then changed over to tower.	At about 300 ft we put on our landing lights and saw a small plane immediately ahead of us and very close. We put on full power and went underneath him.	At no time were we advised that we were overtaking a small aircraft.
We were on the final to 28L when asked,if weight permitted, could we accept 28R. We agreed.	It seems that another aircraft was on approach to 28R.	Later, we were asked by phone if our trip (789) had possibly accepted the clearance for flight 879.
I was working local control, observing an air carrier being sequenced on approach behind a slower air taxi. When the airliner was switched over to my frequency, I told him to go around.	He was at 2,700 ft southbound when I advised him that his traffic was crossing over the airport at 2,600 ft. I told him to climb.	I had advised the approach controller that I thought the air carrier would not fit behind the slower aircraft ahead. The controller replied "We know that," but he did nothing.
When the arrival was 2-1/2 miles out, I asked the air carrier if he was on the roll yet.	The air carrier on 1/2 mile final told me he was going around.	The air carrier pilot still on the runway said "I'm all powered up and passing the last VASI now."
The air carrier was cleared for takeoff with traffic on 3-mile final.	He was not moving and finally the tower said "Take off immediately or clear the runway."	The pilot replied "Okay, we're rolling." But he did not roll immediately. The aircraft on approach went around.
When the ground controller asked the controller if he could cross an air carrier over 08L he was given clearance to do so.	As the taxiing aircraft crossed the active, the local controller instructed an aircraft on final to go around.	In briefing me, the cab coordinator had neglected to mention an aircraft landing on 08L.
I advised him that he appeared to be rapidly overtaking his traffic. The pilot replied: "Yeah, guess we'll have to go around."	Instead, he continued approach and passed the other aircraft close enough to be "pretty hairy."	Later, one pilot said that he didn't appreciate the other aircraft's racing to be in the lead.
As we intercepted the localizer, the tower advised that another aircraft was on the ILS practice instrument approach.	We couldn't spot the other aircraft. And we were at the exact location reported for the trainer.	We continued to express our concern and the tower finally told us that Approach Control would break off the practice approach. Shades of the midair at San Diego.
No mention of traffic. We were changed over to tower.	We took evasive action to keep from descending on light aircraft in front of us.	We were never told that we were behind a slower aircraft.

TABLE 14.– GO-AROUND CAUSES: HUMAN FACTOR ELEMENTS ASSOCIATED WITH RUNWAY LAYOUTS AT NON-STAGE III AIRPORTS

In-flight events		On-runway events	
Error/cause	Number	Error/cause	Number
Parallel runway operations			
Pilot lost visual sighting	1	Intrafacility coordination	1
Pilot swung into approach lane	1	Total	1
Total	2		
Intersecting runway operations			
Controller spaced aircraft in crisscrossing approaches to "dead tie"	1	Controller spacing error	1
		Pilot NORAC on Unicom	1
Practice instrument aproach	1	Controller training	1
Total	2	Total	3
Single runway operations			
Inadequate spacing in-trail	6	Three-aircraft situation	1
Nontower airport (2)		Pilot overshot turnoff	
Traffic not sighted (1)		"Position-and-hold" error	1
Airspeed differential (1)		Tower frequency blocked	
Pilot distraction (1)		Aircraft on takeoff roll	2
Intrafacility coordination – late H/O (1)		Controller spacing error (2)	
Opposite-direction traffic (nontower airport)	4	Aircraft disabled in snow bank on takeoff	1
Unknown traffic (2)		Landing aircraft with opposite-direction approach (nontower airport)	3
Practice back-course ILS (1)			
NORAC during pilot training (1)		No call on Unicom (2)	
		Aggression (1)	
VFR traffic in approach lane (nontower airport)	6	Taxi on/across active runway (non-tower airport)	3
NORAC on Unicom (2)		Taxi back on active (2)	
Unknown traffic (3)		Pilot rushing (1)	
Traffic targeted but not sighted (1)		Total	11
Total	16		

areas. Without ATC restraints, the human factors became more prominent, occasionally quite obvious, in an undisciplined display of aggression. At times, it appeared that cockpit casualness developed into full-blown complacency.

Conflicts were often associated with an airman's refusal to use "party line" Unicom communications. One air carrier touched down and then encountered a light aircraft also touching down on an opposite direction landing. After an evasive go-around, a belated call to Unicom by the flightcrew revealed the presence of two training aircraft practicing touch and go's at the airport. Although cockpit atmosphere is rarely described in ASRS narratives, it was not too surprising that the report included the statement "On the next approach we were too high and fast and went around again."

The airport was uncontrolled. Traffic was reported on 34. I elected to land on 22, because of smoother runway surface. We made two calls on Unicom. No acknowledgment. I continued the approach and landed.

During our landing roll an aircraft passed overhead, approximately 200 ft. He had apparently been on final (to 34) and made a waveoff.

A response to our radio would have avoided this close call.

VFR aircraft were conflict elements associated with limited airspace controls in the non-Stage III airport traffic areas. Unknown VFR aircraft not only cut through approach lanes but became head-on targets with only the see-and-avoid concept as protection.

Twenty-six of the 35 go-arounds reported at non-Stage III airports were attributed to pilot actions, judgments, or perceptions. These causal statistics reflected the total absence of ATC controls at the facilities without towers, where airmen necessarily assumed all traffic separation functions. However, airman errors were also reported more frequently than controller failures or misjudgments during tower-controlled non-Stage III airspace operations.

One of the more disturbing reports was not a go-around but controller concern that a go-around might be executed. With the runway in sight, an air carrier crew opted for an approach to a short, icy runway with a reported 20–30-knot tailwind. High mountainous terrain ahead was so close to the airport that the controller was uncertain that the tailwind would not carry a potential go-around into the hills before the prescribed 180° turn for the pullout could be made. Much to the relief of the controller, the landing was successful.

A selection of nine go-around reports is presented in table 15. As in the previous sections, these reports have been arranged in order to associate the human factors in the occurrences with other salient aspects.

Midair conflicts subsequent to initiation of go-arounds– Fifty go-around maneuvers carried directly and immediately into additional midair conflicts during the climbouts. These statistics do not include incidents in which the go-around aircraft passed over another aircraft on the runway. Table 16 shows the distribution of these conflicts.

When a conflict-into-conflict comparison was made, it was noted that these 50 climbout conflicts make up a third of the conflict-generated go-arounds. These statistics indicate that about one in every three conflict-caused pullouts reported to the ASRS resulted in another conflict.

Twenty-six of these 50 subsequent conflicts occurred in TCA airspace. The remaining 24 midair encounters were almost equally distributed between TRSA and non-Stage III airport areas.

The conflicts that took place subsequent to execution of the go-arounds were often characterized by delayed pilot sighting or tardy controller intervention. In some incidents, neither avoidance nor evasive action was taken.

TABLE 15.– CORRELATION OF HUMAN FACTORS WITH OPERATIONAL CIRCUMSTANCES IN NON-STAGE III GO-AROUND OCCURRENCES

Action	Conflict	Human factor
We landed, called the air carrier numerous times to wave him off, plus turning on our landing lights and finally contemplated heading for the "boonies."	The air carrier finally did go around.	The air carrier never used the Unicom frequency. They seldom do at this airport . . . .
I advised the first officer to call on Unicom that we were taking the runway.	As I nosed into the runway a call came back from an aircraft that was close in on base. I could not get off the runway in time so he had to go around.	After the fact I recognized that we were rushing too much. In a way, I may have felt too familiar with the operations at this airport.
We landed, executed a 180° on the runway to taxi to the terminal. (No taxiways at this airport.) We then saw a small aircraft on final head-on to us. The aircraft kept descending to approximately 50 ft, straight at us.	We had no time to turn and run away from him. Our only alternative was to taxi into the ditch.	Unicom told him we were still on the runway and the pilot answered he was going to land anyway. I grabbed the mike and yelled, "No, you are not going to land. Take the SOB around!" The pilot said he was going to file a violation against me for using bad language over the radio.
A heavy jet was on final. The light plane was told to go around. The pilot acknowledged, and then kept coming.	As the air carrier flared for his landing, the light aircraft passed in front of him. The jet made an abrupt left bank and climbed out. He repeated that he had just had a near miss.	The small-plane pilot was visibly shook up. He said he was getting ready to his commercial license and hoped no one would hear of this.
They cut in a light airplane when we were about 800 ft on final. When they realized it was not going to work they told him to turn left which would have turned him right into us.	He hesitated and by this time he was so close in front of us that we had to go around.	This tower has a habit of giving you a sequence number and then keep slipping light aircraft into the pattern ahead of you.
After I instructed the military trainer to go around, the air carrier pilot kept blocking any acknowledgment from the other aircraft.	I couldn't communicate with him but I watched to make sure that he was going around.	The air carrier pilot kept asking what the other pilot was doing and then said "Tell him to get the hell out of there!" He wouldn't keep quiet.
I was given a traffic advisory about an air carrier on approach. Despite all my looking I couldn't spot him.	Finally, I saw the air carrier. He was less than 100 yards away, at my right and slightly above me. I applied full power, turned hard left, and made a slight dive.	I was quite agitated . . . . All the above probably contributed to my wheels-up landing.

TABLE 15.– CONCLUDED.

Action	Conflict	Human factor
I cleared the aircraft for immediate takeoff. I felt I could still accommodate the aircraft on approach without having to send him around.	Three-fourths miles separation existed.	The supervisor told me to send him around.
	At 600 ft and 2 miles from the runway, we observed a light aircraft turning into our flightpath. We indicated a go-around.	The tower said no traffic reported in our area.

TABLE 16.– CONFLICTS RESULTING FROM GO-AROUND MANEUVERS

Areas	Conflicts	Near midair collisions	Subsequent conflicts as percentages of conflict-generated go-arounds
TCA airports	26	12	33
TRSA airports	13	4	33
Non-Stage III airports	11	2	31
Total	50	18	32

I watched on radar as an air carrier on a go-around merged with the target of a departing climbing aircraft. No control was apparent.

* * *

An aircraft was observed on radar at the time B was at the west boundary. I do not know how close they came. Both targets merged at 4,000 ft about 2 miles southwest of the airport.

* * *

After I told the air carrier to go-around my attention was diverted to coordination with departure control. When I looked again he was still on runway heading and closing on another aircraft.

* * *

The situation was allowed to deteriorate with one aircraft landing R21, one aircraft departing R21 and one aircraft on a go-around from R29 turning 210°. My attention was diverted . . . .

* * *

I told A if he did not see the airport to make an immediate right turn to 300°. He did this. Then I observed a target on a 3-mile final to runway 12. I asked the approach controller if he knew who it was. He told me it was aircraft C. This aircraft had not been coordinated and we were not talking to the pilot. No evasive action was required between the aircraft but I'm not sure.

The physical layouts of the runways in use, the proximity of nearby airports, en route VFR traffic, practice instrument approaches, and runway-change-in-progress were associated factors that could be identified in 36 of the 50 subsequent conflicts. These associated factors are shown in table 17.

TABLE 17.– ASSOCIATED CAUSAL FACTORS IN SECONDARY CONFLICTS DURING THE GO-AROUND MANEUVER

Causal factor	TCA	TRSA	Non-Stage III	Totals
Parallel runway operations	5	0	0	5
Intersecting runway operations	8	4	1	13
Opposite direction traffic	2	2	2	6
Proximity of peripheral airport	1	1	0	2
En route VFR traffic in area	1	3	0	4
Practice instrument approaches	0	2	2	4
Runway change in progress	2	0	0	2
Totals	19	12	5	36

These conflicts during go-around usually occurred immediately after the initiation of the maneuver: 21 of the 50 encounters were with aircraft on initial climb after takeoff.

Aircraft lifting from single or parallel runways underneath the go-around aircraft were the most frequently noted phase of flight. Intersecting runway conflicts were numerically significant with the hazard potential implicit in any crossing runway operations.

Such cross landings set up a real go-around danger if both aircraft decide to "Go" at the same time.

* * *

I watched the go-around merge with an air taxi lifting from an intersecting runway.

* * *

One aircraft lifted off and stayed low. He maintained about 50 ft through the intersection. The go-around aircraft overflew him by about 500 ft.

* * *

We had to maintain approximately 50 ft through the intersection as the go-around aircraft climbed over us.

Many reports described occurrences during which the go-around aircraft passed directly over an aircraft on the runway. These were not tabulated as subsequent conflicts inasmuch as the flightpath was diverging and danger of collision minimum or nonexistent. However, the vertical separation was often alarming to the participants or the observers:

His go-around took him directly over us on our landing roll.

*   *   *

I was cleared to cross but the jet was so close I chose to turn the corner and taxi down the runway to the nearest exit to avoid being in the center of the runway. I chose the turning evasion so that if the two planes collided I would be hit by the jet's wing rather than his fuselage.

*   *   *

The aircraft on takeoff roll crossed beneath our aircraft. It was an alarming noise . . . .

*   *   *

The air carrier's rotation on his go-around was extremely slow and flat. Thus, a near-miss as he went over us on our landing roll.

Controller phrases and sentences characterized the ground/air conflicts.

I knew it would be close but . . . .

*   *   *

I told him to climb fast!

*   *   *

I observed "A" pass above "B" . . . .

*   *   *

He was rolling through the intersection when the air carrier went over him by about 100 ft.

*   *   *

He flew directly over the air carrier at about 200 ft of altitude.

Although human factors frequently had been discernible and identifiable in the causal elements that had generated the go-arounds, the operational confusion enveloping the conflicts after initiation of the pullouts clouded the details of the reports.

In many incidents there were no human factors involved. The go-around maneuvers in themselves precipitated conflicts with aircraft already lifted off and climbing underneath or crisscrossing the flightpath of the go-around airplane.

> I was captain on airliner A departing from airport. Immediately after liftoff, before I could call for gear up, I saw a four-engine airliner B at my 10:30 position; he appeared to be executing a go-around. The tower then called B to "keep it climbing" and told me "to keep it low." We were able to avoid each other by a respectable margin.

* * *

> Just as we lifted off, we heard another air carrier report they were going around. As we started a left turn, the go-around aircraft came into view, about 500 ft away and about 300 ft above . . . .

* * *

> Just as the aircraft rotated we were told to go-around. We both climbed but we were overtaking him. We passed over him with less than 200 ft lateral and 100 ft vertical separation.

* * *

> The air carrier was at 4,400 ft and 280 knots groundspeed at the outer marker. The pilot said he could make it. But he did not. He pulled up directly into the path of an airplane crossing overhead the airport.

* * *

> At approximately 600 ft, the captain spotted the aircraft on the go-around. He was about 500/600 ft away and converging. The other aircraft made an abrupt upward pitch change, indicating they had seen us and then they passed over us.

Breakdowns in the coordination required to introduce an unanticipated go-around into occupied airspace controlled by other ATC sectors could be identified in some reports.

> During a 1-hr period, the tower at this facility made a complete mockery of the term "ATC." In one incident, an air carrier made a pullout from approach with another air carrier departing in front of him. Both aircraft were handed off to me in departure control at the same place at the same time with the departure cleared to climb through the go-around aircraft above him.

* * *

The tower was screwing up, letting departures go without any coordination.

* * *

A go-around aircraft merged with an aircraft that had just taken off . . . .

* * *

A go-around, (first officer flying). As I reached over to raise the gear, I saw a small aircraft in the left center portion of my windshield. A collision was imminent; I used both hands to push forward on the yoke – the nose dropped and we passed under the light aircraft. I then suggested to the controller that he get organized.

* * *

The approach controller was too busy to make all the necessary coordinations. One controller was working arrivals and departures with no assistance available.

* * *

Traffic was not called because the controller thought the two altitude displays were from only one aircraft. Such "slashes" occasionally happen in this area.

Three or four seconds later the "slash" turned out to be an air carrier on a missed approach.

The local controller had not informed departure radar . . . .

* * *

The operational sequences of various conflict events triggered by execution of go-around maneuvers are noted below. In numerous incidents narrated by airmen, the tower controller advised departures of the overtaking or crossing go-around aircraft. Some of the ensuing conflicts resulted from incorrect turn instructions. In other incidents, the pilot's unilateral decision to turn caused the go-around conflict.

The go-around air carrier was told to turn right to avoid the departing aircraft climbing on runway heading. Instead, he started to turn left. I told him to turn right and he said he would take care of it himself. Then he turned right. Confusion became apparent. If pilots would follow instructions, there would be a lot fewer problems.

* * *

We were too high on approach and rather than pull out, we made a 360° turn. The controller was very upset with us. We apparently conflicted with another aircraft.

* * *

> Air carrier was cleared for approach. Then I noted a radar target south of the localizer. I advised the pilot of his traffic. The pilot became abusive and then made an unauthorized 360° turn into the aircraft on the localizer behind him. I told him to turn immediately and climb. Instead he continued straight ahead and conflicted with a third aircraft on downwind.

Throughout the reports of conflicts during the go-around, human factors remained obscure or unmentioned. Only operational situations were cited as pertinent causes. Pilot sighting of traffic was the usual means of conflict avoidance or evasion.

> As we climbed out we saw a military jet pulling up from an approach to XYZ military airport with our flightpaths converging. We turned away.

* * *

> The tower was playing "Chicago-ORD" and rushing the operation. One aircraft was still on his takeoff roll when we went around.

* * *

> One aircraft was making a practice missed approach as the second aircraft entered the pattern. We turned left. We missed the trainer by about 150 yards.

* * *

> We contacted the tower by the OM and were advised we were overtaking traffic ahead. We were told to climb out to 3,000 ft. The airport was VFR, but rain showers in the area. At 1,800 ft we broke out in the clear to discover an air carrier eastbound in our path at twelve o'clock.

Summary and Conclusions

A VFR go-around with all engines operating may be a "piece of cake" for the experienced transport pilot. When viewed from the perspective of ASRS reports, however, pullouts from final approach may have more serious implications.

"The big picture became apparent" reported one air carrier pilot as he initiated a precautionary go-around and immediately heard the tower controller excitedly ("I'd hate to call it panic") calling for a jet to abort his takeoff on the parallel runway.

Eighty percent of the go-arounds involving air carrier operations reported to the ASRS during a 39-month period (mid-1976 to mid-1979) were conflict-avoidance maneuvers. Most of these events took place in crowded TCA airspace. They usually were motivated by the sighting of another aircraft on the landing runway. Converging traffic, resulting in abandoned approaches, invariably was associated with airport runway layouts: parallel runways induced airman mixups in left/right assignments; intersecting runways developed "dead ties" in the rollouts; and single runway operations frequently demonstrated an incompatibility of airspeed performance mix.

Overall, 63% of the reported go-arounds charged to aircraft-on-the-runway situations and 40% of all go-arounds reportedly due to merging traffic took place at TCA terminals. The classic three-aircraft conflict equation, (1) an aircraft on takeoff or landing roll, (2) an aircraft holding in position, (3) an aircraft on close-in final, was a prominent pattern at the busiest and most congested airports.

Perhaps more significant than the conflict-generated go-around statistics was the finding that 32% of the reported climbouts transitioned immediately into subsequent conflicts. Furthermore, these follow-on conflicts involved more serious near midair collision incidents than the initial, often precautionary, avoidance maneuvers.

The analysis of these conflicts during the go-around phase suggested that two separate assumptions may be contributing causal factors in the conflict sequences: (1) work and habit conditioning of ATC controllers to expect that air carriers will complete their landings during good weather conditions, and (2) cockpit preplanning for execution of the published instrument missed-approach procedure for a VMC go-around.

The unexpectedness of an air carrier's go-around, moving rapidly from approach airspace into departure airspace, at times appeared to overload ATC coordination circuits for clearing a path through the terminal area.

The standard, industry-wide practice of utilization of the ILS as the basic air carrier approach procedure to be flown during any weather conditions almost mandates cockpit inclusion of the published missed-approach information in approach briefing preplanning.

At the major airports, controller overriding priorities in separation of traffic or airman sighting of a converging aircraft often intervened to prevent execution of the planned "miss." Parallel runway and intersecting runway operations were frequently associated with the ensuing conflicts.

The functional misfit of an all-IFR procedure employed during VMC terminal conditions was exemplified in ASRS reports relating a pilot's belated recognition of a hazard during his initiation or contemplated initiation of a go-around from a back-course ILS approach.

Parallel and intersecting runway layouts were associated physical factors both in the initial go-around conflicts and in the subsequent during-go-around encounters. Thirty-four percent of all TCA and TRSA airspace incidents referenced runway layouts.

Throughout the conflict reports, at all types of airports or airspace, were threaded the limitations and fallibilities of airmen and controllers. The human factors identifiable in the go-around incidents were various and diverse:

1. Distraction due to inexperienced first officer

2. Mistuning ILS frequency during pilot training activities

3. Airman failure to immediately advise ATC of go-around

4. Communication misunderstandings

5. Fatigue

6. Controller's lack of knowledge of aircraft performance

7. Controller "on-the-job" training with "live" traffic

8. Airman's undue haste to comply with clearance for "immediate takeoff" (thereby taking clearance for another aircraft)

9. Airman delay in complying with clearance for "immediate takeoff"

10. Controller expediting of traffic flow

11. Language barriers

12. Airman aggression to "beat" intersecting traffic

13. Disregard for recommended Unicom communications procedures

ALERT BULLETINS

Introduction

Traditionally, these reports have included a selection of Alert Bulletins, with the responses offered to them by the appropriate addressees – for example, FAA, airport managers, and USAF. Past selections have been subdivided into discrete classifications for the convenience of readers with specific interests. This issue maintains the tradition, but deviates from the regular plan in offering a group of AB's relating only to ATC facilities and procedures problems, as perceived by reporters to ASRS. Incoming reports are assigned either "occurrence" or "situation" status. By the nature of the system, Alert Bulletins nearly always point to situations, which presumably offer possibilities for correction, rather than to occurrences, which cannot be addressed readily by the AB medium. This 13th report presents a number of Alert Bulletins written to point out alleged problems in the workings of the traffic control organization; this topic normally generates more bulletins than any other subject, as might be expected. It is felt that the diversity of the bulletins may be instructive in indicating the many varied and sometimes conflicting views that must be accommodated in effecting the safe and efficient control of air traffic.

ATC: Facilities and Procedures

1. Text of AB: Tucson, AZ, Tucson International Airport. It is reported that the airport layout, as well as the traffic volume and mix at TUS, creates a need for two local control positions in the ATCT. The reporter notes that a second such position was established 2 years ago, but staff complement constraints since then have dictated that the two positions be combined for much of the time. The report contends that combining positions increases controller workload; the local controller is required to monitor three frequencies, with consequent missed transmissions and misunderstandings and frequent blocked transmissions. Pilots communicating with the tower on published frequencies must often be switched to others. The reporter urges staffing for both of the two local control positions.

Text of FAA response: No further action planned. Tucson International Tower is staffed at a level very close to that authorized and adequately to perform authorized functions. Staffing is comparable to other like facilities, with as much special consideration as resources of fully developed controllers will reasonably permit. An increase in authorizations is not warranted by current traffic operations and configuration. The "three frequencies" in use are two VHF frequencies and a UHF (military) frequency. One of the VHF frequencies is used for each of the two major runways/traffic patterns when two local control positions are in use during peak periods. The use of multiple frequencies is not unusual or unsafe. Proper assignment and use of the frequencies during other periods should normally pose no inordinate problems.

* * *

2. Text of AB: Denver, CO, Denver Air Route Traffic Control Center. A pilot report notes consistent difficulty in maintaining air/ground radio communication with Denver Center, the controlling facility, at flight altitudes near MEA in the mountainous area between Fairfield (FFU), Carbon (PUC), and Moab (OAB), and during approaches to airports within that area. Attempts to

relay through other facilities are deemed impractical; reporter suggests installation of a remote communication (RCAG) facility in the affected sector of Denver Center.

Text of FAA response: Fringe area coverage difficulties will be experienced at the lower altitudes in the area described due to high terrain.

Construction of a new RCAG site for the Salt Lake ARTCC (Sunnyside, Utah) will start this summer. Commissioning is anticipated in late CY-79 or early CY-80. A follow-on program is planned to provide an additional channel, from Sunnyside, to the Denver Center sometime in late CY-80. Engineering studies indicate the Sunnyside site should resolve the problems outlined above.

* * *

3. Text of AB: Louisville, KY, Standiford Airport. Controller reports that the interior lighting in Standiford Tower is inadequate in intensity and direction, and that because of this it is difficult for controllers to operate equipment, make entries, and read written material. Reporter contends that the lighting deficiency causes delays in clearances and amendments and could lead to commission of hazardous errors. He recommends installation of small lamps in appropriate locations to alleviate the situation.

Text of FAA response: The subject lighting problem proved difficult to determine with the limited information contained in the NASA Aviation Safety Reporting System Alert Bulletin.

The only possible source of a lighting problem appears to be that the FDEP position is installed approximately 12 inches off-center of the cab ceiling light. The local Airway Facilities personnel are presently adjusting the aiming angle of the light to obtain a direct beam on the position. This is expected to eliminate the problem.

It appears that no national application will be involved.

* * *

4. Text of AB: Hampton, GA, Atlanta Air Route Traffic Control Center. Controller reports that on relocation of the Martin Lake Sector operating position within the Atlanta Center several months ago, the Backup Emergency Communication (BUEC) equipment was left in its previous location, about 50 ft from the sector normal position. Loss of a frequency in the primary equipment, which dictates immediate activation of the BUEC equipment, requires that the sector controller involved seek aid from a disengaged controller or supervisor or, failing that, leave his position in order to activate the backup gear. Reporter feels that ready accessibility of emergency equipment is an urgent requirement and that relocation of the equipment, which would not be costly in time or money, would eliminate the possibility of a potentially disruptive and hazardous occurrence.

Text of FAA Response: The subject bulletin refers to a situation whereby the Backup Emergency Communication (BUEC) selector panels were left in a location 50 ft from where they were needed. On May 26, 1979, the panels were moved to the position of operation where needed, thus correcting the problem. No further action is required.

* * *

5. Text of AB: Oklahoma City, OK, Tinker RAPCON. Two controller reports describe continuing malfunction and unreliable operation of the ARTS III radar equipment in the Tinker RAPCON, serving the Oklahoma City area. Among the problems cited are periodic complete equipment failure, excessive target coasting, and noncorrespondence of ARTS III targets with actual targets. Reporter considers the situation hazardous to air traffic.

Text of FAA response: The high failure rate of printed circuit cards in the Automated Radar Terminal System (ARTS III) at Tinker RAPCON (21 cards during the period October 1978 through March 1979) was attributed to inadequate cooling in the equipment room. New air conditioning ducts and a humidifier have been installed, and no failures have occurred since March 1979.

Target coasting and noncorrespondence of radar and beacon targets was resolved by replacement of a rotary joint, azimuth switch printed circuit card and realignment of the azimuth pulse generator unit. These actions were completed on March 30 and no recurrence of this problem has been reported.

The Tinker RAPCON ARTS III system is operational and no outages have occurred since March 1979.

* * *

6. Text of AB: Various Air Traffic Control Facilities. Reporting controller alleges personal observation of television receivers operating in control tower cabs and radar rooms with tacit approval of facility supervision and management and, at times, with visitors present. Reporter contends that attention of controllers is often diverted from their primary duties while they watch sporting and other events and that the distraction caused by this is highly detrimental to the safety of air traffic. He points out that this type of activity is contrary to regulations and recommends that measures be taken to ensure that television viewing be restricted in traffic control facilities to off-duty times and nonoperational spaces.

Text of FAA response: We do not believe there is a need to specifically single out the particular alleged situation in this report in the form of a directive. The Air Traffic Facility chief is responsible for proper management of the facility. That responsibility includes assuring that nonjob-related activities will not interfere with the primary task of the facility. If the allegations are true, the facility chief is not properly managing his facility. Accordingly, we plan to forward this alert bulletin along with a letter reminding facility managers of their responsibility.

* * *

7. Text of AB: Miami, FL, Miami International Airport. A controller reports that radio transmission on frequency 119.7 MHz is subject to frequent failure. Citing one recent incident involving several aircraft within the Miami TRACON area of responsibility, the backup emergency equipment also malfunctioned on the same frequency, forcing a controller to relay air traffic control instructions through an air carrier aircraft using a different frequency. Reporter contends that a serious hazard to air traffic will exist until improved radio equipment is installed in the TRACON.

Text of FAA response: Frequency 119.7 is a remote frequency located at Fort Lauderdale, Florida. It is used as a departure and Stage III service frequency for traffic operating north of Fort Lauderdale International Airport.

In an attempt to solve the chronic problems associated with frequency 119.7, TELCO has ceased microwaving this frequency between Fort Lauderdale and Miami and has converted to high-quality landline transference. Additionally, the following improvements have also been made:

1. A new receiver antenna has been installed.

2. Solid-state equipment has been installed.

3. A new emergency multichannel tranceiver has been installed.

4. A new main/standby selector panel with indicator lights has been installed.

The last reported outage on 119.7 was June 8, 1979. Frequency 119.7 is more reliable than before the improvements were made.

* * *

8. Text of AB: Knoxville, TN, McGhee Tyson Airport. A pilot reporter describes a recent landing at McGhee Tyson Airport during which, as his aircraft topped a rise in the runway, he sighted men and equipment at work on the runway ahead; he aborted the landing, executed a go-around, and landed safely after observing from altitude that the men and equipment were working in the final 3,000 ft of runway which had been noted in the current ATIS broadcast as "closed." The ATIS message had included the information that 6,500 ft of runway was usable but neither the ATIS nor the tower controller had mentioned that men and equipment were on the runway. Combination of afternoon sun in his face, visual distortion caused by heat waves rising from the concrete surface, runway rise, and surprise induced in the pilot the impression that the aircraft was much closer to the men and equipment than was actually the case. He recommends that flightcrews be advised whenever men and equipment are on, or close to, runways, even though information on length restriction may have been given.

Text of FAA response: FAA Handbook 7110.65A, Air Traffic Control, paragraph 901.a requires controllers to describe vehicles, persons, or equipment in a manner "which will assist pilots in recognizing them." Since the alert bulletin did not include a specific time/date reference and was received after normal record retention time for the date of the bulletin (May 31), we were unable to substantiate the specifics.

Airport construction was in progress; a portion of runway 22R was closed; and the threshold was displaced approximately as stated in the bulletin.

Information concerning available landing and departure length was contained in the ATIS broadcast, and the information was disseminated via the NOTAM system. The information provided should also have created pilot "awareness" that the construction in progress could include people and equipment in the construction area.

Prior to and during the time of construction, numerous controller briefings were held concerning airport construction and its impact on users. The provisions of paragraph 901.a of Handbook 7110.65A were included in these briefings.

We were unable to determine whether the provisions of paragraph 901.a were actually followed at all times during this incident. However, the facility management is aware of the need to emphasize to all controllers the need for compliance with paragraph 901.a of Handbook 7110.65A.

* * *

9. Text of AB: Johnstown, PA, Johnstown-Cambria County Airport. A recent pilot report describes a landing at Johnstown during which air-ground communication could not be established. Reporter mentions a postlanding visit to the Flight Service Station on the field; the Detroit Sectional Chart depicts 123.6 MHz as a Johnstown communication frequency. The current Airport/Facility Directory (Northeast U.S.) omits any listing of that communication frequency or of a Flight Service Station at Johnstown.

Text of FAA response: The current issue of the Airport/Facility Directory (Northeast U.S.), dated 14 June 1979 on page 125, under Johnstown, Cambria Co., does not list Johnstown FSS in the normal manner. It does however list under COMM/NAVAID REMARKS: Johnstown FSS provides AAS 1130-0430z daily on frequency 123.6. The next issue of the Airport/Facility Directory effective 9 August will publish the information in the proper format.

We cannot determine why radio communication could not be established with the appropriate FSS.

* * *

10. Text of AB: Washington, D.C., Washington National Airport. A controller reports that radio communication effectiveness in DCA Tower has been severely hampered for several months by frequent bursts of interference on the air-traffic-control frequencies. The periods of interference may last as long as 2 min; during these periods, air-ground transmissions become unintelligible and aircraft departures have, of necessity, been delayed because of the inability of controllers to communicate with departing aircraft. Reporter states that alleviation attempts have been unsuccessful and feels that the problem is affecting aviation safety adversely in the congested Washington area. He recommends that urgent measures be taken to eliminate the interference.

Text of FAA response: Considerable effort has been expended by our Eastern Region and a variety of problems have been identified and corrected. It is now believed that the problem has been solved. Factors contributing to the problem are as follows:

1. Ignition noise from vehicles operating on the airport
2. Faulty rotary joint on ASR-8
3. Airline computer radiation
4. Faulty splices on Telco lines

* * *

11. Text of AB: Louisville, KY, Standiford Field Airport. Two controller reports deal with loss of primary radio transmitting/receiving capability in Standiford Tower, allegedly as a result of maintenance activity not coordinated with the working controllers. According to reporter, the emergency backup transceiver is located above the console in a position requiring the controller to stand on a chair and hold a flashlight in order to reach and use its controls. The reports strongly suggest a need for a more modern backup communication system at this facility.

Text of FAA response: The subject bulletin refers to an incident whereby the primary communications was lost and the emergency transceiver was in an awkward location to use at Louisville, Kentucky, Standiford Field. This situation was discussed between local Airway Facilities and Air Traffic personnel. A review of facility AT logs failed to disclose any communications outage which could be attributed to the situation described in the bulletin. However, Local Airway Facilities personnel will work with Air Traffic personnel to move the emergency transceiver wherever it is the most convenient.

* * *

12. Text of AB: Roswell, NM, Roswell Industrial Air Center. Reporter notes that the official closing time of Roswell Tower coincides closely with the regular nightly arrival and departure times of four flights, and that there are frequent occasions when additional traffic is also present. He states that arrival aircraft are not always visible to FSS personnel and feels that hours of tower operation should be revised or extended to eliminate the potential hazard presented by the increasing amount of uncontrolled traffic.

Text of FAA response: The Roswell Industrial Air Center Airport Traffic Control Tower closes at 10 p.m. One ZIA Airlines flight is scheduled to arrive at 9:40 p.m. and an Air Midwest flight arrives at 10:50 p.m. Each flight normally departs about 15 min after arrival.

The number of aircraft using the airport at any one time after 10 p.m. is far below a level that requires the services of a control tower to ensure a safe, orderly, and expeditious flow of traffic.

Concerning safety, our experience with other part-time and nontower airports indicates that pilots operate safely without control towers during low density traffic periods. Of 428 control towers we operate, 220 are part-time facilities. Many of these are comparable to, or busier than, the Roswell facility, and several do not have flight service stations (FSS) on the airport.

However, the control tower is only part of the system that provides air traffic services to flight operations in the Roswell area. All air traffic services essential to 24-hour operation of the airport are continued. Albuquerque Center provides approach control services (separation of IFR aircraft) 24 hours daily. Roswell FSS remains in operation to provide airport communications, weather observations, flight plan processing, airport advisories, and other functions. The same separation of aircraft operating under instrument flight rules in the terminal area will continue. Aircraft operating under visual flight rules will continue to operate visually in accordance with standard rules, regulations, and procedures; i.e., "see-and-avoid."

* * *

13. Text of AB: Pasco, WA, Tri-Cities Airport. Pilot report alleges that ground and local control positions at Tri-Cities Tower are combined much of the time, with one controller performing both ground and local control functions. According to reporter, it is customary at the facility to operate both ground and local frequencies with continuously open microphones, with the result that all air traffic control information is transmitted simultaneously on both frequencies. Since pilots monitor only one of the frequencies, depending on the phase of flight, considerable confusion exists and leads to overlapping transmissions and frequent message blocking. Reporter recommends that each of the two control frequencies be reserved for communication of its particular function in the interest of increased safety.

Text of FAA response: An evaluation was conducted concerning simultaneous use of ground control and local control transmitters in lieu of selecting a single transmitter.

The practice of selecting/deselecting so as to transmit on a single frequency at a time while positions of operation are combined is time-consuming, cumbersome and, more importantly, could have an effect on safety. If the incorrect frequency were selected when an imminent situation presented itself – one requiring split-second response – the results could create an unsafe condition. Because of his/her duties, the local controller is sometimes a distance away from the transceivers and does not have immediate access to frequency selector keys.

The statement that transmitting on two frequencies is unsafe because an individual can only hear one side of the conversation is, in our opinion, questionable. Many facilities transmit simultaneously on UHF/VHF while working a mix of traffic. Many times, pilots hear dual-frequency transmissions and, to the best of our knowledge, this has not presented a threat to safety. However, controllers should avoid the indiscriminate use of simultaneous frequency transmissions.

Good controller judgment should dictate whether or not simultaneous transmissions are necessary.

* * *

14. Text of AB: Memphis, TN, Memphis International Airport. Reporting pilot notes that at MEM, arrival ATIS information is broadcast on frequency 121.0 MHz, departure ATIS utilizes frequency 119.45 MHz. In normal practice, arriving pilots attempt receipt of the arrival information at considerable distance from the airport, before commencing descent, in order to decrease the workload in the lower altitude terminal environment. According to reporter, 121.0 MHz is subject to severe interference under these conditions as a result of other tower and clearance delivery transmissions on the same frequency within reception range, requiring repeated attempts to understand the ATIS data over the interference. Conversely, frequency 119.45 MHz, used for MEM departure data, which is normally used only on the ground at short range, is not subject to interference from other transmissions. Reporter suggests that message clarity would be greatly improved, cockpit workload lessened, and accurate receipt of data increased through reversing of the two MEM ATIS frequencies to provide arrival information on 119.45 MHz and departure information on 121.0 MHz.

Text of FAA response: Investigation of the subject report indicates it was probably filed by a jet pilot inbound to Memphis from the east. Although only one report of a similar nature has been received by Memphis ATC Tower, the potential exists to receive Atlanta Approach Control north satellite sector on 121.0 MHz when at high altitude and well east of Memphis.

While we recognize the users' desire to obtain ATIS information as early as possible, they should not expect clear communications beyond the protected area. ATIS frequencies are protected for a maximum of 50 miles for arrival ATIS and 20 miles for departure ATIS. A project to relocate ATIS frequencies to a special frequency spectrum is under way at this time. The proposed frequency range would be above 121.0 MHz and, therefore, resolve this specific complaint.

We do not plan to change the Memphis International Airport ATIS frequencies at this time due to the ongoing project and lack of assurance from frequency management that 119.45 MHz would be any less susceptible to interference than 121.0 MHz if used beyond the protected area.

* * *

15. Text of AB: Los Angeles, CA, Los Angeles Air Route Traffic Control Center; Las Vegas, NV, Las Vegas TRACON. Controller reports allege that provisions of a Letter of Agreement between Los Angeles Center and Las Vegas TRACON intended to ensure separation between aircraft departing Las Vegas are not being observed; as a consequence: aircraft departing in-trail are handed off to Los Angeles Center with inadequate separation existing or imminent. Reports cite instances of speed differentials, contending that at time of hand-off, the second aircraft was in an overtaking condition. Reporters feel that it is the TRACON's responsibility to ensure separation, rather than to expect the Center to institute corrective measures on short notice.

Text of FAA response: This situation was first brought to the attention of the Los Angeles Air Route Traffic Control Center (ARTCC) Area Officer on January 15, 1979. It was subsequently discussed with the Las Vegas Air Traffic Control Tower (ATCT) Operations Officer on February 7, 1979. As a result of this discussion, Las Vegas ATCT provided an operational briefing to all air traffic control personnel emphasizing the need to ensure 5 miles in-trail separation between successive aircraft being handed off to Los Angeles ARTCC. These briefings were conducted the week of February 11, 1979.

To further clarify the 5-mile in-trail requirement, the Terminal Control Area Letter of Agreement was revised as follows: "The minimum separation between all aircraft being handed off between Los Angeles Center and Las Vegas Tower shall be 5 miles in-trail and remain constant or increase." This revised agreement was included in a Las Vegas ATCT operational briefing conducted the week of March 12, 1979, and became effective March 14, 1979.

The subject was again discussed by the Los Angeles ARTCC Area Officer and a Facility Air Traffic Technical Advisory Committee (FATTAC) representative at the Las Vegas ATCT on July 11 and 12, 1979. As a result of these discussions, Las Vegas ATCT agreed to reemphasize the handoff requirements per the letter of agreement. This was accomplished by an all personnel memo dated July 24, 1979 subject: Acceptance Parameter Reference ZLA Handoff/Use of Visual Separation. The Terminal Control Area Letter of Agreement was again included in an operational briefing conducted during the weeks of August 13, 1979, and September 4, 1979.

In conclusion, we are aware of no instances of nonadherence to this particular procedure since July 13, 1979.

* * *

16. Text of AB: Des Moines, IA, Des Moines Municipal Airport – Des Moines TRACON. Controller reports that despite repeated log entries and at least one UCR the ATC Radar Beacon System at Des Moines has been unreliable for a considerable period of time. According to reporter, beacon returns on the radarscope coast, do not interrogate, and jump. Boosting of gain to improve weak returns results in "ring around." The situation is considered hazardous to air traffic and reporter recommends a concentrated effort to locate the basic faults, followed by required remedial action.

Text of FAA response: The subject report pertains to missing beacon targets which are the result of holes existing in the beacon coverage pattern. These holes are generated by rf energy from the beacon "hog trough" antenna being reflected in a lobing manner from the ground.

The new 5-foot open array beacon antenna was installed at the Des Moines facility on October 16, and a significant reduction in missing targets was achieved. This appears to have corrected the reported problem. The region will continue to monitor the beacon system at this facility and perform any required changes to the antenna tilt and transmitter/receiver adjustments to optimize the performance.

* * *

17. Text of AB: San Juan, PR, Puerto Rico International Airport, and Isla Grande Airport. Reporter, calling attention to the large number of pilots without native English fluency operating in the San Juan area, suggests that confusion and potentially hazardous situations could be reduced if ground/air radio transmissions were to be made with slower delivery speeds and with careful enunciation. Reporter contends that rapid and poorly enunciated ATC communications and ATIS broadcasts often aggravate critical situations for pilots and crewmembers in this area who are accustomed to speaking a language other than English; such pilots and crewmembers frequently experience difficulty in properly understanding the full intent of the messages transmitted.

Text of FAA response: The FAA Southern Region Air Traffic Division has recommended a program be instituted in the San Juan area to brief all controllers on the need for slower speech rates and more precise pronunciation and enunciation. They have provided San Juan offices/facilities with a copy of the ASRS Bulletin for background explanatory information. The regional Flight Standards staff has been provided a copy of the bulletin for appropriate action in the area of user competency in this regard.

* * *

18. Text of AB: Kaunakakai, HI, Molokai Airport. Reports describe difficulties in safely controlling air traffic at Molokai Airport because of the deficiencies of the control tower in use. According to reporters, the tower is a mobile type which, due to its design and construction, and to its location on the airport, does not permit full vision of the airport operating areas. An incident of lost separation in the traffic pattern is cited as an example of the controllers' inability to observe the traffic. In addition to the visibility obstruction attributable to the tower design and location, it is subject to morning and afternoon glare and reflection problems which add to the allegedly hazardous condition.

Text of FAA response: Investigation of the subject report indicates that the air traffic control service provided by Molokai Tower is safe and efficient.

The present structure, though mobile in design, is permanently located on the roof of the airport fire station, allowing controllers full vision of the airport movement area.

We are not aware of any air traffic incidents at Molokai that can be attributed to the controller's inability to observe traffic.

Morning, afternoon, and evening glare/reflection problems and finding methods of minimizing their effect are ongoing concerns at all control towers. Tower shades were installed at Molokai in late September 1979. We are not satisfied with the working conditions in the present tower and have taken action to correct the situation.

A project to relocate Molokai Tower has been included in our budgetary planning. However, it must be kept in mind that this item has to compete for priority with all other National Airspace System requirements on a regional as well as national basis. Our facilities and equipment funds are limited and consideration of a project does not ensure inclusion in a specific budget.

* * *

19. Text of AB: Manhattan, KS, Manhattan Municipal Airport. Reporting pilot questions the policy under which he is instructed by Kansas City Center to communicate with Marshall AAF Tower while descending inbound to nearby Manhattan. Reporter contends that applicable regulations do not require this contact while his aircraft is outside and above Marshall ATA and that in complying with the instruction, his attention is diverted by lengthy weather and airport information at Marshall at a time when prudence dictates that he should be in communication with Manhattan FSS. The pilot cites a recent instance in which he was actually in the Manhattan traffic pattern and unable to obtain critical and timely traffic information needed, because of the required monitoring of the irrelevant Marshall transmission.

Text of FAA response: The facilities involved have revised procedures to more effectively accommodate the Manhattan arrivals that penetrate the Marshall AAF Airport Traffic Area.

The intent of the communications transfer to Marshall AAF Tower was to allow the pilot to meet the provision of FAR 91.85(b) which states, "Unless otherwise authorized or required by ATC no person may operate an aircraft within an airport traffic area," and FAR 91.87(b) which states, "no person may, within an airport traffic area, operate an aircraft to, from, or on an airport having a control tower operated by the United States unless two-way radio communications are maintained between the aircraft and the control tower."

If the pilot was aware of a condition unknown to ATC (in this instance the aircraft would not penetrate the Marshall AAF Airport Traffic Area en route to Manhattan Municipal) and in the pilot's opinion remaining on Marshall AAF Tower frequency would place the aircraft in jeopardy, it is the pilot's responsibility to request an amended clearance.

* * *

20. Text of AB: Portland, OR, Portland TRACON. It has been reported that no standardized procedures exist for the sequencing of arrival and departure air traffic using runway 20 at PDX. This runway is frequently active when severe weather conditions occur and the lack of standard procedures places methods for handling traffic on individual controller discretion. Reporter contends that agreements should be reached with Seattle Center to ensure an orderly flow to the single runway, replacing the present procedure of giving responsibility to the TRACON to adjust speed, descent, vectors, and trail interval of arriving and departing aircraft. Reporter recommends that specific directives be implemented to ensure safe and standardized handling of this traffic.

Text of FAA response: The reported deficiencies noted in Alert Bulletin 80:9 have been investigated. There was some validity and merit to the reported deficiencies and recommendation. Portland Tower was aware of the need for standardized procedures for a runway 20 flow; however, due to the infrequent use of runway 20 – less than one percent utilization – development and implementation were delayed by higher-priority endeavors.

Initial development began in August 1979, to establish airspace alignment and procedures for a runway 20 operation. All automation, airspace alignment, and video map requirements were completed in January 1980. The facility directive is in print and team briefings concluded on March 7, 1980. Runway 20 procedures will become effective on March 13, 1980.

We are confident that the directive being implemented by Portland Tower will provide standardized procedures for handling a runway 20 operation.

* * *

21. Text of AB: Los Angeles, CA, Los Angeles International Airport. Reporting pilot, citing a recent profile descent to LAX during which it was alleged by ATC that he deviated from the charted procedure at the 21 DME fix by continuing descent on the glide slope instead of maintaining 7,000 ft, contends that the profile descent chart directs a 7,000-ft crossing altitude at this point but omits mention of "maintain," and that normal procedure would sanction the continuing descent. Reporter recommends standardization of profile descent chart terminology, pointing out that charts for other airports include "maintain" under circumstances not unlike those cited; he considers the chart terminology differences from one airport to another conducive to confusion for pilots and controllers alike.

Text of FAA response: The altitude restrictions for Baset and Royal intersections on the Los Angeles Runways 24/25 Profile Descent Chart were revised (3/2/80) to read, "cross at and maintain 7,000."

Ames Research Center
National Aeronautics and Space Administration
Moffett Field, California 94035, December 5, 1980

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1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
NASA TM-81274		

4. Title and Subtitle	5. Report Date
NASA AVIATION SAFETY REPORTING SYSTEM QUARTERLY REPORT NO. 13	September 1981
	6. Performing Organization Code
7. Author(s)	8. Performing Organization Report No. A-8504
	10. Work Unit No.
9. Performing Organization Name and Address Ames Research Center, NASA, Moffett Field, Calif. 94035 and Aviation Safety Reporting System Office Battelle's Columbus Division, Mountain View, Calif. 94043	11. Contract or Grant No.
	13. Type of Report and Period Covered Technical Memorandum
12. Sponsoring Agency Name and Address National Aeronautics and Space Administration Washington, D.C. 20546	14. Sponsoring Agency Code

15. Supplementary Notes

16. Abstract

ASRS Quarterly Report No. 13 presents a selection of aviation safety reports that relate to loss of control in flight, problems that occur as a result of similar sounding alphanumerics, and pilot incapacitation. A separate research study, which deals with problems related to the go-around maneuver in air carrier operations, is also included. The Alert Bulletin section contains a sampling of bulletins (and FAA responses to them) that pertain to air traffic control systems and procedures.

17. Key Words (Suggested by Author(s))	18. Distribution Statement
Aviation safety Incident reporting Human factors Go-around maneuver	Unclassified - Unlimited Subject Category 03

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price*
Unclassified	Unclassified	58	A05

*For sale by the National Technical Information Service, Springfield, Virginia 22161

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