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HUMAN FACTORS ASSOCIATED WITH POTENTIAL CONFLICTS AT UNCONTROLLED AIRPORTS

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Introduction

Nontower airports are recognized as a hazardous area for midair collisions. In 1972 the National Transportation Safety Board (NTSB) issued a special study, *Midair Collisions in U.S. Civil Aviation 1969-1970*. This study said that "uncontrolled airports present a serious hazard to aviation safety in that 34% of the 1968, 56% of the 1969 and 38% of the 1970 midair collision accidents occurred at airports where there was no control tower." Since the principal means of avoiding conflicts in the traffic patterns of such airports is the see-and-avoid concept, it follows that breakdowns in the functioning of that concept were the immediate causes of those midair collisions. The purpose of this report is to examine one type of hazard – potential conflicts at nontower airports – in an effort to help pilots reduce the risks of midair collisions.

The report focuses on an analysis of a group of ASRS reports regarding *potential conflicts* at *nontower airports*.

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A potential conflict in this report is a situation in which at least one pilot perceived a potential for a midair collision.

Nontower airports fall into three broad categories:

1. Airports with a published unicom frequency (122.8 MHz).

2. Airports with a Flight Service Station (FSS) Airport Advisory Service located on the field.

3. Airports with neither a published unicom frequency nor an FSS located on the field.

Approach

The ASRS database was first searched for reports relating to the three categories of airports. At the time of the search there were 6,327 reports in the database. The search identified 279 reports in which the phrases *unicom, nontower airport*, or *airport advisory service* were used.

The 279 reports were then sorted to establish the group of reports that involved a "potential conflict" classification and with the aircraft in the traffic pattern. This sort yielded 127 reports for further analysis. The 127 reports were further sorted to identify each occurrence as to location in the traffic pattern and the relative motion between the aircraft when the potential conflict occurred. The reports were finally sorted by the three specific categories of nontower airports.

Each of the reports was read and features of interest such as commonality of sequence of events, pilot behavior, communications procedures, flight procedures and other features that seemed repetitive were recorded. The reporter's narrative was the most fruitful part of the database from which to obtain the detail and the flavor of what was happening prior to and at the time of the occurrence.

Results

Table 1 depicts the number of reports analyzed with regard to where the potential conflict occurred and the relative motion between the aircraft. About two-thirds of all the reports involved situations where both aircraft were on final leg, or one aircraft was airborne and one was on the runway. These findings are compatible with NTSB's findings that "most of the 1969-1970 midair accidents occurred at or near the uncontrolled airport at low altitudes (100 ft or less) at low closure rates. . . ."

Table 2 shows, for 127 reports analyzed, the number of aircraft that used appropriate radio procedures in each leg of the traffic pattern. While not all reporters specifically mentioned who used the radio, it was usually relatively easy to deduce whether two, one, or none broadcast their position and intentions. In some cases the ASRS safety analyst made a call back to the reporter to determine who used the radio.

TABLE 1. – TRAFFIC PATTERN LEG VS RELATIVE MOTION

	Same direction	Opposite direction	Intersecting converging
Runway Airborne Mix	16	20	10
Crosswind leg	1	1	1
Downwind leg	5	4	7
Base leg	2	2	7
Final leg	29	5	5
Takeoff leg	0	6	6

TABLE 2. – POSITION IN TRAFFIC PATTERN VS NUMBER OF AIRCRAFT USING APPROPRIATE RADIO PROCEDURE

Phase of pattern	Number of reports	Pilots, using radio, FSS, Unicom, Multicom			
		0	1	(0 or 1)	2
Base leg	11	1	6	(7)	4
Final leg	39	10	22	(32)	7
Downwind leg	16	3	8	(11)	5
Airborne, runway, mix	46	9	27	(36)	10
Crosswind leg	3	2	0	(2)	1
Takeoff leg	12	3	5	(8)	4
Total	127	28	68	(96)	31
Percent	100	22	54	(76)	24

Table 2 shows that in approximately 22% of the 127 reports, neither pilot was reported to have used the radio to communicate the aircraft's position and/or intentions. In approximately 54% of the reports only one pilot used the radio. However, if one pilot used the radio but the other pilot was not listening, that had the same effect as if no radio call was made. Thus, in 76% of the reports (22% plus 54%) there was no aural exchange of position information.

For further reference, table 3 lists the number of reports from each of the three categories of airports and their communication services versus the number of pilots using the services. There was sufficient consistency in the percentage of reports where two, one, or none used the appropriate radio frequency at the three categories of airports that they were lumped together for further analysis.

Tables 2 and 3 show that in about one-quarter of the occurrences the two pilots did use the appropriate radio procedures, but still had a potential conflict. There were several human factors identified that were associated with potential conflicts, for example, maneuvering with apparent knowledge of the other aircraft in the area, did not see, did not hear, misjudged distance/spacing, and aircraft blended into the background.

There were 50 reports of potential conflicts that occurred on base leg and final leg. Analysis shows that in 42% of these 50 reports, one person was using nonstandard procedures by making a straight-in approach.

In 97 of the 127 reports, evasive action was taken or there was no time for evasive action after the other aircraft was seen, and the only thing that prevented a collision was, apparently, chance.

TABLE 3. – COMMUNICATION SERVICES AT AIRPORTS VS NUMBER OF PILOTS USING SERVICES

Services available	Number of reports	Pilots using appropriate radio frequency			
		0	1	(0 or 1)	2
Unicom on field	97	21	52	(73)	24
No Unicom on field	10	5	5	(10)	0
FSS on field	20	2	11	(13)	7
Total	127	28	68	(96)	31
Percent	100	22	54	(76)	24

Discussion

The information obtained from the ASRS reports on the circumstances leading to potential conflicts, such as lack of use of radio procedures, straight-in approaches, and misjudged distances, also appears to be compatible with other NTSB findings. The NTSB report said ". . . that the majority of the midair collisions which occurred during the three year period (1968-1970) could have been avoided by the see-and-avoid concept if the aircrews had conformed to the existing flight rules, followed sound cockpit procedures and if the aircraft involved had been more conspicuous," and "in the airport environment where 63% of all the accidents occurred, there was disregard for the right-of-way of other aircraft, a lack of adherence to proper pattern procedures and a lack of knowledge and alertness for the possibility of a midair collision, even though it was evident that all the ingredients existed."

Pertinent portions of the A.I.M.– The Airman's Information Manual (A.I.M.) contains rather specific recommendations about traffic advisory services when operating at nontower airports. First, it notes that "combining an aural/visual alertness and complying with the following recommended practices will enhance safety of flight into and out of uncontrolled airports." This can be read as an indication to pilots that aircraft information can be received by the auditory system as well as by sight.

The A.I.M. continues with a specific, different frequency assigned for each of the three categories of airports: 123.6 MHz at a field with a flight service station (FSS), 122.8 MHz at a field with only a published unicom frequency, and 122.9 MHz at a field with no facility (this was true during the period of this study; more frequencies have recently been allocated). A.I.M. notes also that at fields with part-time towers, the tower frequency is still used when the tower is closed. Therefore, in approaching or departing an airport without an operating control tower there should be no question about which frequency to use.

The A.I.M. also recommends that, "As standard operating practice all inbound traffic should continuously monitor the appropriate field facility frequency from 15 miles to landing" and inbound aircraft should broadcast position, altitude and intentions 5 miles out, and broadcast position on downwind, base and final.

For outbound aircraft the A.I.M. recommends "Departure aircraft should monitor the appropriate frequency either prior to or when ready to taxi," and broadcast position and intentions when ready to taxi and before taking runway for takeoff (the appendix contains excerpts from A.I.M., Part 1).

The A.I.M. recommended procedure for radio usage augments the procedure for systematized flow of traffic and takes advantage of the use of the pilot's sense of hearing. It recommends that the pilot call the FSS, if one is located on the field, and obtain traffic advisories from FSS personnel. At other types of airports without an operating control tower A.I.M. recommends that the pilot use the appropriate frequency and use the radio as a public address system to announce position and intentions. The procedures, when properly used, should alert pilots to which runway is already being used, and should alert pilots in the pattern (if any) to the intentions of other pilots. If used by all pilots, the radio procedure should remove many of the surprises that come from another pilot's nonstandard or unexpected behavior, narrow the visual search area, and assist in maintaining visual separation.

Inadequacies in communication procedures– From the ASRS reports it is clear that a significant number of pilots did not use the A.I.M. recommended radio procedures to augment vision for purposes of separation.

In 22% of the reports, neither pilot used the proper radio procedures. Unicom could have helped these pilots avoid a potential conflict.

> After I turned final I saw aircraft 'B' on downwind. This was the only other airplane in the traffic pattern. My student was making the approach and landing. We continued on final until we were past the numbers and beginning our flare when aircraft 'B' flew directly over us (I estimate about 15-20 ft) and made a landing. I took over the controls and evasive action was needed to prevent an accident. We started a go-around and turned left to parallel the runway. It was not until I established radio contact with the other aircraft that they realized what had happened or that we had ever been in the area. Later discussion with one of the pilots of the other plane revealed they were on a student training flight also. The CFI was in the left seat and his student (working on instructor rating) was flying in right seat. They said at no time did they see my aircraft . . .

Unicom is a busy and sometimes congested frequency, but the following report is one of the few reports that mention frequency congestion. In any event, neither pilot used unicom to announce position.

> After departing Big Beaver Airport from runway 27 (about 5 or 6 miles west of McKinley) I overflew McKinley Airport at about 2,000 ft MSL to determine from the wind tetrahedron what their active runway was. Noting that the tetrahedron and the wind sock indicated 27 as the active I flew away from the airport (to the south) to descend, and then entered a left downwind for runway 27. I did not utilize unicom to announce my entry into the pattern; there were no other aircraft visible and the frequency was congested. All was well during the approach until about halfway down final I noted aircraft B approaching head-on on final for runway 9. I immediately initiated a go-around with evasive action to the right, as did the other aircraft. After I had landed back at Big Beaver and gotten home I called McKinley Airport and spoke to the airport manager. He stated the tetrahedron was in fact indicating 27 as the active, but the pilot of the other aircraft thought that the wind was changing and decided to use runway 9 . . . .

In another 54% of the reports only one pilot had used the recommended communication procedure. However, when one pilot used the radio but the other pilot was not listening, that had the same effect as if no radio call was made. Thus, in 76% of the reports (22% plus 54%) there was no aural exchange of current position information and pilot's intentions.

In the following examples, one pilot used unicom to announce position and intentions, but the second pilot apparently wasn't listening and a conflict occurred.

> Student pilot and myself (CFI) practicing traffic patterns and landings . . . left-hand traffic. Announced on 122.8 when on downwind, base, and final approach.

> Just as student flared for landing he shouted "J . .a C . . ." at the same time I saw a wing pass underneath our wing. I grabbed the controls and throttle and banked sharply right and up. At about 50 ft AGL and well to the side of the runway I looked back and saw a blue and white aircraft rolling out, crew looking straight ahead . . . estimate miss by no more than 2 ft.
>
> * * *
>
> I entered downwind at 1,000 ft announcing on 122.8 of my intentions; no other aircraft reported or in sight . . . called on downwind . . . final . . . at approximately 1/2 mile out about 200 ft I noticed aircraft 'B' on a right base leg in a slight turn right wing high . . . repeated calls to him that he was cutting off traffic on final . . . went unnoticed . . . he turned final at a height of about 600 ft near the end of runway. It looked like he was going around. I continued approach. He then pulled on full flaps, cut engine, and proceeded to drop directly in front of me. I had to swerve to right . . . give power and go around. He passed off the front of me at about 100 ft. Repeated calls for his number went unanswered. I went around and landed where he was waiting to do another touch-and-go.

In a few reports it is noted that monitoring of the frequency paid off for a pilot when a third party warned of two aircraft close together.

> Incident occurred during a dawn patrol at 2G5. Right traffic is standard for runway 35. I was turning final off right base, when over the unicom I heard "Two aircraft turning final for 35." I then saw the aircraft 'B' low turning final off left base. I initiated a go-around. What I didn't see was brought to my attention by the alert unicom observer wherever he was located.

This study of 127 potential conflicts involves 254 pilots. In 28 cases neither pilot (56 pilots) and in 68 cases only one pilot used proper radio procedure. Thus, 124 (49%) of the 254 pilots did not take advantage of the additional protection of an aural transfer of information.

Traffic pattern errors– In addition to the apparent lack of observance of standardized radio procedures, there was an apparent lack of consistency in following standardized traffic patterns at nontower airports as recommended in the A.I.M. The traffic pattern recommendation is not specific with regard to the distance of leg from the runway, or the altitudes to be flown, but it does describe a systematized flow for aircraft. When entering the pattern, aircraft are directed to make an entry to the downwind leg, and are reminded to make left-hand turns when approaching the airport unless lights or traffic pattern indicators indicate a right-hand pattern. Straight-in approaches are not recommended.

The ASRS reports contain 50 potential conflicts on the base leg or final leg and in 42% of these reports one aircraft was reported to be on a straight-in approach. That suggests that when one aircraft is flown in a nonstandard pattern the risk of the pilots not seeing each other is high. It is difficult to explain why the pilot of an aircraft on straight-in does not see the other aircraft. It may be suggested that once a pilot is on final, his concentration is on the runway and the "see and avoid"

failure is the pilot "not looking" combined with "did not see" since an aircraft on collision course has zero relative momvement and is harder for the eye to see. For example:

> I was turning final on 34 (right traffic). Aircraft B was making straight-in approach. I saw B, made 360° turn to avoid collision. Right traffic is normally in effect for this runway. I made calls stating my position on downwind and base on 122.8. Aircraft B pilot later told me he was being vectored by Midland approach and was not on 122.8 and did not see me until I made an evasive turn.

In this situation it should be stressed that the pilot has an obligation to continue communicating with ATC, though he is encouraged to report position and intentions on the appropriate frequency.

Other reports involving straight-in approaches are cited later in other parts of the analysis.

There were also seven reports where one pilot flew a traffic pattern from the wrong side, that is, a left-hand pattern instead of a right-hand pattern.

> . . . I crossed the airport at 1,800 MSL to check the segmented circle for wind and pattern indicators. . a . the pattern indicators indicated runway 19 has a right-turn traffic pattern. The right-turn pattern for runway 19 was also previously confirmed from the A.I.M. I broadcast on 122.9 MHz entering downwind . . . turning base. Almost immediately thereafter I saw aircraft B coming at me at the same altitude. I turned right, broadcasting that I was going around and the aircraft B turned left, landing on runway 19. At no time did the pilot of aircraft B announce his intentions on 122.9 MHz . . . .

It is apparent that in 75% of the reports at least one pilot was denied the use of one sense – hearing – for an aural alerting as to someone else's position; the pilot chose to rely on vision entirely, and there was a failure of the "see and avoid" concept for a period of time.

Failures of visual separation– Since pilots rely heavily on the visual sense it is of value to explore the visual mechanisms that fail and permit inadequate separation to occur. An analysis of the possible failures of the ability to "see" suggest the reasons can be grouped into two broad categories: human and mechanical, as shown in table 4.

TABLE 4. – POSSIBLE FAILURES OF THE ABILITY TO SEE

Human	Mechanical
Did not see	Structural obstruction to vision
Did not perceive relative movement	Blinded by Sun position
Blend into background	Cloud or visibility or
Did not look	precipitation impairment
Tunnel vision (threat)	Windshield
Misjudged distance	Dirty
Intentional maneuvering	Precipitation on
	Reflections on

The narratives in the ASRS are not always complete enough to classify each report into one of these categories and subcategories. However, examination of the database suggests the classification is valid. Examples exist for each of the subcategories except windshield.

Under human factors the classification "did not see" means the pilot is looking, but can not perceive the relative movement of another aircraft, or the other aircraft blends into the background. Pilots report:

> . . . At that time of day . . . traffic on base leg is extremely hard to see because of mountains in the background . . a.

* * *

> I was in the right seat of my aircraft allowing a friend in the left seat to practice landings. Just as the base to final turn was started I saw a Sun glint on metal, at about two o'clock low. I then saw it was an aircraft "Bâ' type military trainer about 300 ft below on a straight-in final. I gave the pilot (of my aircraft) direction to get spacing and both aircraft completed touch and go landings uneventfully. The B pilot, a student under instruction, announced position on unicom about 15 seconds after I saw him. The point of all this was that the B was painted in a factory camouflage scheme. After I saw the Sun glint and was tracking visually it was very hard to distinguish the aircraft from the green field below it. If only my left seat had been occupied and if the B pilot had not made his call on unicom this would have been a classic small airport midair. Both of these "ifsâ' didn't occur and there was no immediate danger. But the camouflage paint added significantly to the hazard caused by the already dangerous practice of doing a straight-in to an uncontrolled airport.

In another report the pilot did not see the other aircraft for unknown reasons.

> I had just completed a 45° from airport entry to downwind, for right traffic to runway 24, Oceanside, heading 060° when aircraft B passed me on my right, same altitude and within 75 ft. No evasive action was taken by me, not having seen the other aircraft which approached from my rear. Aircraft B, after passing on my right, turned in front of me to establish an adequate downwind leg, then a turn into base/final, close in approach. At this time I extended my downwind until B reached the runway threshold, at which time I initiated my final landing sequence. I contacted the pilot of B at the airport administration building. He indicated he did not see me at any time . . a

"Did not lookâ' is just that – the pilot was not looking, at least not at the critical time just prior to the potential conflict. The reasons could be cockpit workload, fatigue, or inattention due to other pressures. In marginal VFR weather the pilot of the aircraft in the following example can be visualized as spending more time looking inside the cockpit at instruments than outside for other aircraft.

> We were vectored to a straight-in ILS to MVY runway 24. MVY has no control tower. Weather was -X 3 miles visibility haze wind 2405. We intercepted localizer 3

miles outside the marker. When we were 2 miles from the marker approach control advised VFR traffic ten o'clock – 2 miles – southwest bound converging. We observed the traffic perhaps 1,000-1,500 ft higher than us. We intercepted the glide slope and started to descend. The VFR aircraft "A" started a descent into our altitude converging toward the localizer. When he was at the same altitude and perhaps one-half mile we executed a missed approach to the right. The VFR traffic was last seen tracking the localizer toward the airport. We were communicating with approach on number 1 comm. and unicom on number 2 comm The VFR aircraft was on neither.

Tunnel vision as a human factor is that phenomenon which results from a person who feels threatened and who concentrates so heavily on the perceived problem (threat) that other events or tasks are completely ignored. In this next example, a student on the first solo flight appeared to concentrate on the traffic pattern task to the exclusion of other events.

I was returning to the airport with a newly rated private pilot at the controls. We heard on 122.8 that they were using runway 22 and there were two planes practicing landings. We announced our intentions of using runway 22 approximately 5 miles out and noticed the other plane starting his takeoff run. We again answered on 122.8 our entering a 45° angle one-half way down the downwind. By this time the other plane was just starting to turn downwind. I watched the other plane out of the rear window keeping the pilot (in my aircraft) informed of his location and told him the other plane was gaining on us. I could not see how the other plane could possibly not see us directly ahead. When we started to turn base, I lost sight of the other plane and made the statement to the pilot that the other plane would probably extend his downwind leg for more spacing. Our downwind leg was quite close to the airport as the new pilots are told to keep it in close. Our actual base leg was a continual 180° turn into final arriving on final with full flaps. As we just started to level our wings we noticed the other B aircraft slice by on the inside of our left wing descending at the same time missing our plane by approximately 25 ft. We were approximately 300 ft AGL at the time. We immediately applied full power and started a right turn and a go around. This near mishap was witnessed by two other pilots, plus the airport manager/instructor who informed us upon our landing that this was his student's first solo flight; he had had 30 hours of instruction prior to his solo. After talking to the student pilot he said he did not hear us on the radio and never saw us in the air. We talked with the student pilot on the radio before we landed and informed him of almost causing a midair. I believe the student pilot was so preoccupied with trying to hold his pattern that he neither saw nor heard anything.

In a few cases a pilot simply erred and misjudged a distance. In this report the pilot admits he made a mistake in the spacing and attempted to apologize but the other pilot was angry.

A light aircraft taxied up to the departure end of the runway and looked for arriving traffic. He saw an aircraft on a long final and felt that he had time to depart before the arriving aircraft could land. He took the active and took off. As he lifted off he heard on unicom the pilot of the arriving aircraft ask for the identification of the departing aircraft. At about 150 ft into the air the arriving aircraft passed 150 ft

laterally and 25 ft horizontally from the departing aircraft. Since the departing aircraft felt that he had made an error he returned and landed hoping to apologize to the other pilot. The other pilot landed and without shutting down his aircraft stated that he was going to report the departing pilot for cutting him off. He said that he should have realized that he was approaching at 110 knots and should have given him more room. Reporter states that he was not in a hurry to leave the airport and really thought that he had enough room to depart.

Potential conflicts and intentional maneuvers– In some cases, the pilot intentionally maneuvered an aircraft into a situation where the margin of error was too small and created a hazard for others.

> My student and I were practicing short-field landings and takeoffs. We had announced plans for a stop-and-go while on downwind on 122.9, normal at a field with no radio facilities. We accomplished a good, short landing, slightly right of center stopping about 500 ft from the threshold with a 10 knot wind down the runway (slight left crosswind). We were resetting the flaps and preparing for takeoff when, about 15 seconds after we landed, aircraft B landed beside our left wing. I was startled and discontinued our flight, taxiing in behind aircraft B. Upon questioning, the other pilot claimed that he: (1) saw nothing wrong with his actions; (2) was an instructor who had been instructing before I was born; (3) felt that I should have been broadcasting on 122.8, if anything, even though it wasn't listed as a Unicom field. He said he was listening on 122.8 but did not claim to have broadcasted.

Was the pilot of the second plane just obnoxious or did he truly not recognize he created a hazard?

Visual obstructions– The second broad category of possible failures to "see" is the mechanical failure category in which something physically obstructs the pilot's vision. For example, sections of the airframe blocking the view are suggested.

> . . . while turning onto base with his left wing down it would have given him a good view of the final approach course. After he turned final he landed long and was a little high on the approach so that we were probably hidden under his nose.

* * *

> . . . because of our low wing and the fact that 'B' was dragging in on low final, we did not see it at all until nearly landing on it . . . .

Conflicts between high and low wing aircraft will be the subject of a later study.

The Sun, while not, strictly speaking, a mechanical obstruction to vision, can cause a blind spot, which denies the pilot the ability to see. (Parenthetical statements in this report are the reporter's own.)

I was departing . . a to take an FAA written exam in DuPage, Illinois. Departure airport was unattended and I did not expect other aircraft to be in the area (pilot error). I tuned radio to unicom, monitored about 20 seconds (should have been longer) looked over traffic area and runway for other aircraft while taxiing about 5 mph (I should have stopped). Called in the blind that I was back taxiing runway 24 and taxied onto 24 at the far end. Immediately upon turning toward the approach end of 24 I noticed the other aircraft had just landed on 24. We were then separated by about 2,000 ft so no evasive action was required. Aircraft landing was no radio, yellow color, and probably near the Sun when I looked for other traffic.

When attempting to operate in a "see and avoid" environment, as the helicopter does in the next report, it is obvious that fog becomes an "obstacle" to seeing.

On approach to Davenport Airport, less than 1 mile visibility, approach advised target 4 miles twelve o'clock then 2 miles twelve o'clock. Approach tried to contact unidentified aircraft on 121.7 and 120.(?). Our aircraft tried to contact on 122.(?). No success. At a distance of one-fourth mile the helicopter passed in the fog. He was on no flight plan, no communications with control . . .

It is intuitive that things on the windshield will be an obstacle to vision. However, no reports were located in which pilots have specifically classified that as a cause for not seeing another aircraft.

Conflicts in which both aircraft were perceived– After exploring the failure to "see" and the failure to augment seeing with hearing it is desirable to consider the other 25% of the reports. In those reports (31) both pilots were on the appropriate radio frequency, position and/or intention information was announced but a conflict still occurred.

In looking at the human factor ingredients of those 31 reports it was found that there were 11 reports where one aircraft was maneuvered too close to another aircraft with the apparent knowledge the other aircraft was in the area. As seen in an earlier example, the maneuvering may have been done deliberately. Examples from 11 reports focus on the flying behavior of those who create hazards by intentional acts.

In the following example one pilot made a straight-in approach, apparently in spite of the knowledge that two other aircraft were in a standard pattern.

At 1920 hours, I approached Hilton Head Island Airport, contacted unicom and received reported traffic and active runway. I then entered a downwind for runway 21. Another plane was also on a very long downwind, substantially behind me and was not a factor in this incident. As I turned base for 21, I heard aircraft "B" contact unicom for an airport advisory. Unicom gave the requested information and advised of the two other planes that were in the pattern. I then announced aircraft A on left base for 21, Hilton Head, and unicom acknowledged. As I completed my base leg for 21 and prepared to turn final, aircraft B came roaring in doing a straight-in on runway 21. Naturally I had already begun my descent from pattern altitude for the landing on 21. As I started my turn for final, aircraft B roared by me at the

same altitude. I climbed out of the pattern to avoid a collision and advised unicom of same. I also requested a complaint be filed, to which aicraft B replied, "This isn't a controlled field." Both aircraft had landing lights on. My aircraft also had a rotating beacon on top, a strobe light under and working nav lights. This was a near miss caused by aircraft B's refusal to enter the traffic pattern and by his insistence upon doing a straight-in landing without consideration for other traffic.

Could the pilot of the aircraft on straight-in actually believe that because it is not a controlled field anybody can use any type of traffic pattern he wants to?

The pilot of aircraft B in the following example had an apparent disregard for margins of error.

Aircraft A reported on 3 mile final to Goodland radio and aircraft B reported he had aircraft A in sight and would follow aircraft A. I landed, executed a 180° turn on the runway to taxi to the terminal (no taxiways at Goodland) where I observed an aircraft on final approach, head-on to me. Radio twice said: "aircraft A is on the runway." "Aircraft B report on final." Aircraft B said he was going to land anyway. At this point he had approximately 40% of the runway available. I had all lights on, including taxi and landing lights. My first officer said twice to aircraft B that we were on the runway. Aircraft B said he was going to land and hold short of us. I had stopped aircraft A and started to turn around again to run from the landing aircraft. It became obvious that I could not turn around in time and that my only alternative was to taxi the 500 ft into the ditch with the possibility of collapsing the nose gear and a possibility of a fire. I was heading off the runway, grapped the mike and said, "No, you are not going to land, take the s.o.b. around again." Aircraft B descended to approximately 50 ft, then went around passing over us by approximately 100 ft. I turned aircraft A approximately 80° back right and taxied to the terminal without leaving the runway. Aircraft B said he was violating me for using bad language on the radio. I felt the only way to get his attention was to shock him into going around.

Note that the A.I.M. publicizes in its *Good Operating Practices* section (see appendix) the FAA voluntary pilot safety program, "Operation Lights On." All pilots are encouraged to turn their anticollision lights on any time their engines are running; and to turn on landing lights within 10 miles of any airport day or night. This procedure is to enhance the "see and be seen" concept. In the ASRS database when lights are mentioned it is usually mentioned as a fact, as it was in the previous two examples.

In the next example was a straight-in approach made to save time? If so, was it worth the risk?

Wind was light and variable, had been out of 330 at 2-3 mph earlier and runway 33 was still in use. Windsock was swinging all around but the wind was not enough to register on the windspeed gauge. I was with a student in aircraft A and we called for an advisory and were told that winds were light and variable and that 33 was favored. I then heard aircraft B say he was taxiing to 33. As we entered downwind I heard C call for an advisory, which was given. We reported downwind 33, full stop.

C again called for an advisory, this time I gave it to him from the air. B said he was taking off 33 and started rolling. We turned base for 33 and I heard C say he was on final for runway 15. I again told him that 33 was the active, one aircraft B was taking off and one, A, on final (us) for 33. The B pilot was airborne by then and took evasive action. The C continued the approach and landed on 15. We got on the radio again and said we were going around which we did and again set up the approach to 33 and landed. I talked to the pilot of C about listening to the advisory, not making straight-in approaches, and that he could have destroyed two other aircraft. He appeared to be totally unconcerned and his only comment was that the wind sock said 150°

In the next example a pilot deliberately flew near another aircraft to show or vent his anger.

Alamagordo-White Sands Regional Airport, no tower, unicom 122.8 only communications. Aircraft no. 1, whose pilot was unfamiliar with the airport, had just landed on runway 21 and was rolling out. Aircraft no. 2 taxied into position for takeoff after aircraft number 1 had passed. Aircraft no. 3 flew over the approach end of the runway and entered a close-in left downwind and base leg. Number 1 aircraft was taking longer than usual to clear the runway and had taxied past the normal turn off, thus preventing number 2 from taking off. Aircraft no. 3 did not extend his pattern and the pilot told the pilot of no. 2 he should check the regulations as to who has the right of way. When aircraft no. 1 cleared the runway, no. 2 started takeoff roll. At this point no. 3 was on close final. At about 1,000 ft down the runway, no. 3 overtook no. 2 and crossed left, over and in front of no. 2 within 50 ft. There is no room in aviation for pilots with this attitude toward safety. The pilot flying no. 3 aircraft is a flight instructor and flying school chief pilot. This was observed from a fourth aircraft at the approach end of the runway 21 by a student pilot and instructor pilot.

In the group of reports where both pilots made radio announcements there were eight regarding pilots who still failed to see and/or hear each other. In the following example, one pilot did not see the other aircraft and the second pilot did not hear the first pilot.

Aircraft A with a student and instructor was on left downwind after completing a touch-and-go. Aircraft B made a descending entry over the airport to a left downwind, overtaking aircraft A from behind and above. When the instructor in aircraft A saw aircraft B in the top of his windshield he allowed his aircraft to slow down and descend to avoid collision with aircraft B. The pilot of aircraft B said he had broadcast his intentions over unicom. The pilot of aircraft A said he also was monitoring unicom and did not hear any broadcast. The instructor said the pilot of aircraft B thought once he had broadcast his intentions he could do as he pleased. Aircraft B pilot never saw aircraft A. Aircraft A was operating with both landing lights and rotating beacon.

In addition, there were three reports on pilots who misjudged distance or spacing and the remaining reports were on miscellaneous problems such as announcing takeoff on one runway but actually taking off on another.

> Approaching my destination airport at the end of our IFR flight from Atlanta, GA, I radioed for runway and traffic information while approximately 15 miles out on unicom. I was advised there was no traffic and the active runway was 3. Reaching the airport I entered a right downwind leg, standard at this airport, and reported downwind on unicom. When I began my base leg I heard aircraft B report he was departing runway 3 at Peter Knight. When I heard this I reported that I was on a right base turning final for runway 3. When I completed my turn to final I observed no aircraft in the vicinity of runway 3 and assumed he had departed. I continued my approach and landing and while rolling out through the intersection of runway 3 and 35, aircraft B passed overhead, barely missing the vertical stabilizer of my aircraft by not more than 10 ft. I attribute this incident to inexperience and hazardous operation of aircraft on behalf of the other pilot. Inadequate lighting of most single engine aircraft and obstructions to vision on this airport for the runways involved.

When both pilots did announce their intentions on the proper frequency, the main causes of potential conflicts in this study were the maneuvering of aircraft (35%) the failure to see (26%), and miscellaneous other errors (39%).

Summary

It appears that the Airman's Information Manual (A.I.M.) recommended procedures for the use of the radio at nontower airports were not being used in these cases. The A.I.M. notes that "combining an aural/visual alertness . . . will enhance safety." However, 49% of the pilots in this study did not avail themselves of the additional protection of an aural transfer of information. In 76% of the reports of potential conflicts, either one or both pilots failed to use the recommended procedures.

There were 50 reports of potential conflicts that took place on the base leg or final leg of the traffic pattern. In 42% of those reports the A.I.M. recommended traffic pattern was not being used, in that one aircraft was reported to be making a straight-in approach.

The reasons for the failure to see can be grouped into the two broad categories of human failures and mechanical failures. The reports are not always detailed enough to permit placing each report into the two categories and their subcategories. However, there are reports in the database that tend to support this model as a reasonable analytic tool for further study.

In 31 reports (25% of the study) both pilots had used the proper radio procedure but there was still a potential conflict. An analysis of these revealed that in 11 reports, one pilot maneuvered the aircraft so that the other pilot took evasive action or at least felt his safety was threatened. These reports suggest that a certain number of pilots may lack discipline or lack a sense of caution in maintaining an adequate margin of safety.

Though both pilots used the proper radio procedure there were eight reports in which the pilots still did not see each other. The remaining 12 reports were various other failures that permit two aircraft to maneuver close to each other.

Conclusions

Major behavioral factors that were associated with potential conflicts were (1) the lack of use of recommended radio procedures and (2) the use of nonstandard traffic patterns.

Some pilots apparently deliberately maneuvered their aircraft to cause a hazard for other aircraft.

The findings in this study of ASRS data regarding potential conflicts are in general agreement with the findings of the National Transportation Safety Board in an earlier study of midair collisions in U.S. civil aviation.

It is suggested that an innovative and far-reaching educational program may be useful in motivating pilots to practice safe procedures that have proved their effectiveness and have been recommended for universal application.

APPENDIX
AIRMAN'S INFORMATION MANUAL, PART 1

Airport Advisory Practices at Nontower Airports

There is no substitute for alertness while in the vicinity of an airport. An airport may have a flight service station, unicom operator, or no facility at all. Pilots should predetermine what, if any, service is available at a particular airport. Combining an aural/visual alertness and complying with the following recommended practices will enhance safety of flight into and out of uncontrolled airports.

1. Recommended Traffic Advisory Practices– As standard operating practice all inbound traffic should continuously monitor the appropriate field facility frequency from 15 miles to landing. Departure aircraft should monitor the appropriate frequency either prior to or when ready to taxi.

a. Inbound aircraft

Airport	Frequency	Broadcast position, altitude, intentions	Broadcast position
Part-time tower (when closed)	Tower local control	5 miles	Downwind. base, final
Part-time tower (closed) but Full-time FSS	Tower local control	*15 miles	*5 miles
Part-time FSS (closed)	123.6	5 miles	Downwind. base, final
Full-time or Part-time FSS (open)	123.6	*15 miles	*5 miles
UNICOM	122.8	*5 miles	
UNICOM (if unable establish contact)	122.8	5 miles	Downwind. base, final
No facility on airport	122.9	5 miles	Downwind. base, final

b. Outbound aircraft

Airport	Frequency	Broadcast position and intentions
Part-time tower (closed)	Tower local control	When ready to taxi: and before taking runway for takeoff
Part-time tower (closed) but Full-time FSS	Tower local control	*When ready to taxi; and before taking runway for takeoff
Part-time FSS (closed)	123.6	When ready to taxi; and before taking runway for takeoff
Full-time or Part-time FSS (open)	123.6	*When ready to taxi; and before taking runway for takeoff
UNICOM	122.8	*When ready to taxi; and before taking runway for takeoff
UNICOM (if unable establish contact)	122.8	When ready to taxi; and before taking runway for takeoff
No facility on airport	122.9	When ready to taxi; and before taking runway for takeoff

Nontower Airports

1. Preparatory to landing at an airport without an operating control tower, but at which either an FSS or a UNICOM is located, pilots should contact the FSS or UNICOM for traffic advisories, wind, runway in use, and traffic flow information. CAUTION – ALL AIRCRAFT MAY NOT BE COMMUNICATING WITH THE FSS OR UNICOM. THEY CAN ONLY ISSUE TRAFFIC ADVISORIES ON THOSE THEY ARE AWARE OF. (See AIRPORT ADVISORIES AT NONTOWER AIRPORTS in Services Available to Pilots in this chapter.)

2. At those airportsenot having a tower, FSS or UNICOM (See AIRPORT ADVISORIES AT NONTOWER AIRPORTS in this chapter), visual indicators, if installed, provided the following information:

a. The segmented circle system is designed to provide traffic pattern information at airports without operating control towers. The system consists of the following components:

The segmented circle – Located in a position affording maximum visibility to pilots in the air and on the ground and providing a centralized location for other elements of the system.

The Wind Direction Indicator – A wind cone, wind sock, or wind tee installed near the operational runway to indicate wind direction and velocity. The large end of the wind cone/wind sock points into the wind as does the large end (cross bar) of the wind tee. FAA directives require that the wind

tee be free swinging and not tied down or locked to indicate landing direction. These signaling devices may be located in the center of the segmented circle and may be lighted for night use. Pilots are cautioned against using a tetrahedron to indicate wind direction and velocity.

The Landing Direction Indicator – A tetrahedron is installed when conditions at the airport warrant its use. It may be used to indicate the direction of landings and takeoffs. A tetrahedron may be located at the center of a segmented circle and may be lighted for night operations. The small end of the tetrahedron points in the direction of landing. Pilots are cautioned against using a tetrahedron for any purpose other than as an indicator of landing direction, and to disregard the tetrahedron at an airport with an operating tower. Tower instructions supersede tetrahedron indications.

Landing strip indicators – Installed in pairs as shown in the segmented circle diagram and used to show the alignment of landing strips.

Traffic pattern indicators – Arranged in pairs in conjunction with landing strip indicators and used to indicate the direction of turns when there is a variation from the normal left traffic pattern. (If there is no segmented circle installed at the airport, traffic pattern indicators may be installed on or near the end of the runway.)

b. Where installed, a flashing amber light near the center of the segmented circle (or on top of the control tower or adjoining building) indicates that a right traffic pattern is in effect at the time.

c. Preparatory to landing at an airport without a control tower, or when the control tower is not in operation, the pilot should concern himself with the indicator for the approach end of the runway to be used. When approaching for landing, all turns must be made to the left unless a light signal or traffic pattern indicator indicates that turns should be made to the right. If the pilot will mentally enlarge the indicator for the runway to be used, the base and final approach legs of the traffic pattern to be flown immediately become apparent. Similar treatment of the indicator at the departure end of the runway will clearly indicate the direction of turn after takeoff.

d. When two or more aircraft are approaching an airport for the purpose of landing, the aircraft at the lower altitude has the right of way, but it shall not take advantage of this rule to cut in front of another which is on final approach to land, or to overtake that aircraft. (Ref: FAR 91.67(f))

Traffic Patterns

At most airports and military air bases, traffic pattern altitudes for propeller driven aircraft generally extend from 600 feet to as high as 1500 ft above the ground. Also traffic pattern altitudes for military turbojet aircraft sometimes extend up to 2500 feet above the ground. Therefore, pilots of en route aircraft should be constantly on the alert for other aircraft in traffic patterns and avoid these areas whenever possible.

Traffic pattern altitudes should be maintained unless otherwise required by the applicable distance from cloud criteria (FAR 91.105).