





## ACROJET COMPETITION EVENTS

All AcroJet competitions are timed. Serious competitors should select a ground start. The clock starts when their aircraft crosses the spot line on the runway. It stops when the aircraft stops on the ground again. A landing must include crossing the spot line on the airstrip, going from south to north. This means all landings are headwind landings (landing from north to south results in a tailwind landing, since the prevailing winds are from the north).

A good competitor plans a quick route from takeoff to the event, and another route from the event's endpoint to landing. Many of the events leave you at low altitude travelling fast. Therefore, you may wish to end with a short, steep climb before flying the "final" to touchdown. This helps reduce speed and line up for a good approach. Unfortunately, it also takes a little extra time (but not as much as approaching the runway too fast for landing, and therefore being forced to go around again!)

**Airborne Starts:** Less ambitious flyers are allowed to start an event airborne. You begin at 250' flying over the airstrip. When the plane crosses the spot line on the strip (a split second later) the timer begins. When the event is finished, flying over the spot line again from south to north ends the event. Since the spot line is a small and difficult target, fly low and use the plane shadow as an aid in crossing the spot line.

**Landing Events:** Landing events (spot landing and simulated flame-out) always require you to finish on the ground, even if you start airborne. In addition you are scored on how close you come to the spot line.

**Checkpoints:** Each event has a number of "checkpoints" you must pass to successfully complete it. Each checkpoint is listed in the requirements section for the event. In the air you'll see the edge of the screen flash blue briefly each time you complete a checkpoint.

**Missed Checkpoints:** You must pass the checkpoints in proper order. If you miss a checkpoint, you can come around and try it again, continuing the event from there.

**Crashes:** If you crash during an event, you get a small partial score for the checkpoints you passed. However, this amount is so small that you're always better serve by flying a little more cautiously and completing the event. If you crash in the Pentathlon or Decathlon, you are allowed to fly the remaining events. In real life, of course, the damage to the aircraft and pilot could prohibit any further competition.

**IMPORTANT NOTE:** The airstrip diagram on the cockpit map is much larger than the real airstrip for legibility reasons. When flying by the cockpit map, guide yourself by the CENTER spotline of the airstrip, NOT the edges.

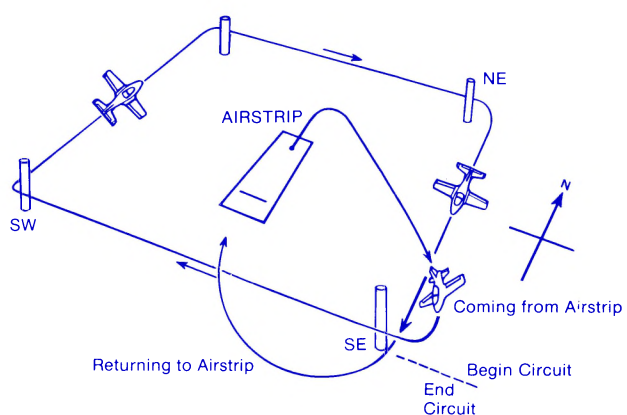
### Pylon Race

**Difficulty Factor:** 1.0

**Requirements:** After leaving the airstrip, the contestant must pass outside of the pylons in order: SE pylon first, then SW pylon, NW pylon, NE pylon, and finally the SE pylon again; then the contestant must return to the airstrip.

**Remarks:** This event is a pure air-race. To be successful, you must plan how to fly the minimum distance at the maximum speed. This means turning as close to the pylons as possible, and flying very low to the ground (gaining altitude costs both time and speed). Pilots typically fly this entire event with full throttle. Be sure to watch your EGT — if the temperature passes 700° you'll lose your engine! Just before this happens a good pilot will cut his throttle (to 7) briefly to cool the engine, then apply full throttle again.

### PYLON RACE



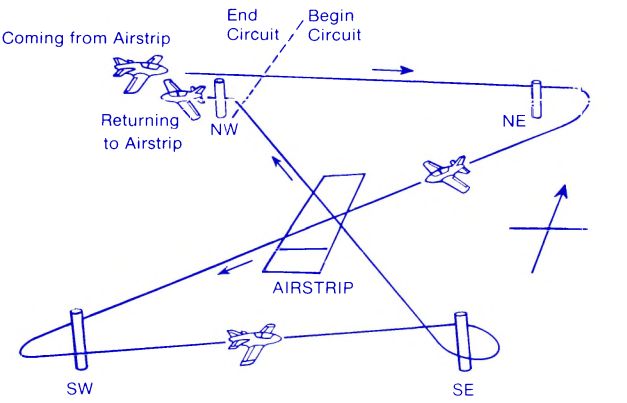
### Slalom Race

**Difficulty Factor:** 1.5

**Requirements:** After leaving the airstrip, the contestant must fly around the pylons from north to south in order: NW first, then NE, SW, SE, and NW again; then the contestant must return to the airstrip.

**Remarks:** This event is another air-race, but requires much more practice. It's easy to pass the wrong side of a pylon, or become disoriented by a tight turn and fly to the wrong pylon. If you miss a pylon, you can always circle around and pass it correctly, then continue. Good competitors plan their heading for each leg of the flight before the event.

### SLALOM RACE



### Ribbon Cut

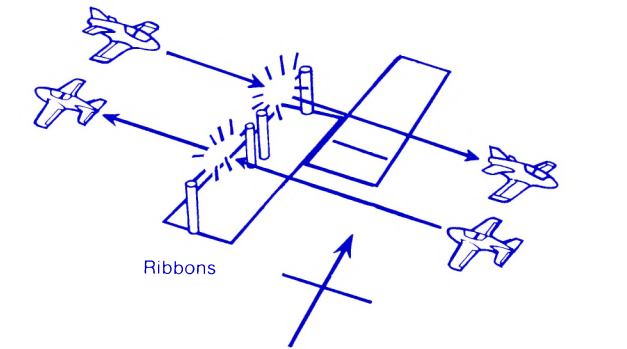
**Difficulty Factor:** 1.7

**Requirements:** After leaving the airstrip, the contestant must cut both 3" ribbons, then the contestant must return to the airstrip. Ribbons need not be cut in any particular order, nor from any specific direction.

**Remarks:** This is a traditional and famous event. It requires precise low-level flying to reach the right altitude for the cut while plotting a course that avoids crashing into a pole. The secret to this event is planning which direction to approach the ribbon, the turn between the cuts, and how to land quickly after the final cut.

### RIBBON CUT

(Can be flown in either direction)  
(Ribbons can be cut in any order)

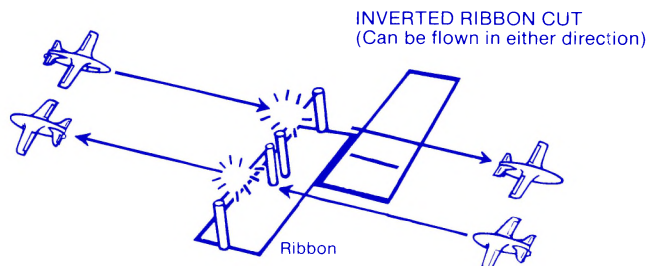


### Inverted Ribbon Cut

**Difficulty Factor:** 2.4

**Requirements:** After leaving the airstrip, the contestant must cut both 3" ribbons while flying inverted; then the contestant must return to the airstrip. Ribbons need not be cut in any particular order, nor from any specific direction.

**Remarks:** This event seems the same as the regular ribbon cut, but appearances are deceiving. Inverted flying presents a special challenge. Pitch control movements (climbing and diving) are reversed. Also competitors master inverted flying, times at the ribbon even out. Success then comes to the pilot who best manages the normal-inverted transitions quickly. There is more than one way to get quickly from takeoff to inverted flight, and then from inverted flight to landing.

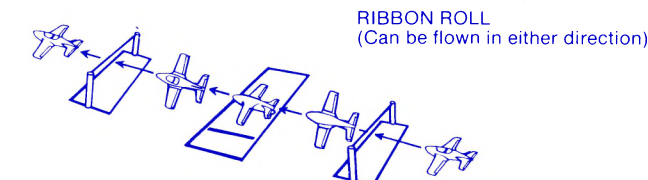


### Ribbon Roll

**Difficulty Factor:** 2.2

**Requirements:** After leaving the airstrip, the contestant must pass under one gate in level flight, perform a complete 360° roll, and pass under the other gate in level flight; then the contestant must return to the airstrip. Gates can be passed in either direction.

**Remarks:** This is an extremely difficult event because between the gates you must climb slightly to permit a safe aileron roll, then drop down again to pass the second gate. Flying the event slowly gives you more time to manage your roll and diving to the second gate, but flying too slowly can be fatal during the roll itself.



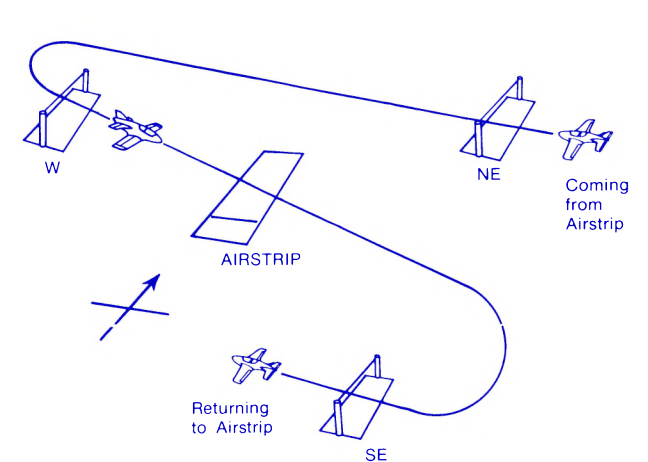
### Under Ribbon Race

**Difficulty Factor:** 2.0

**Requirements:** After leaving the airstrip, the contestant must pass under the three gates in proper order: first the NE gate from east to west, then the W gate from west to east, and finally the SE gate from east to west; then the contestant must return to the airstrip. The contestant must pass UNDER the gate ribbon - cutting the ribbon is an unsuccessful pass.

**Remarks:** This is the toughest AcroJet competition air race, since the desire to turn tightly through the gates must be tempered with the low altitude flown and the danger of a wingtip catching the ribbon if you pass through the gate with a steep bank. Success comes with finishing your turns before the gates, which means flying a longer straight-path between gates. Some contestants have experimented with half-loops instead of conventional turns, since it is entirely legal to fly the gates inverted.

### UNDER RIBBON RACE



### Loop

**Difficulty Factor:** 2.5

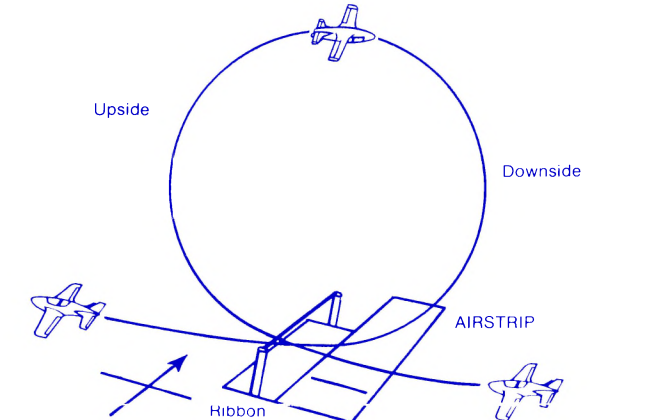
**Requirements:** After leaving the airstrip, the contestant must fly through the gate, do a loop over the gate, and fly through the gate again; then the contestant must return to the airstrip.

**Remarks:** Normally sport pilots perform loops starting at 10,000', so they have room for error. Before attempting this event at competition levels, practice loops at a higher altitude, and master looping back to the same altitude. See the section on aerobatic flying for a detailed discussion of how to control a loop, including how to use joystick backpressure properly.

Survival and success in this event requires precise altitude control. Your safety margin can be increased by making the initial gate pass at more than 250 mph, and then climb to a very high altitude (5,000' or more) on the upside of the loop. Before you begin the downside turn extend the loop outward while flying inverted (i.e., don't drop the nose too fast), this will give you plenty of room after you come around to line up on the gate for the final pass. Later you can work on narrowing the size of the loop and improving your time.

### LOOP

(Can be flown in either direction)



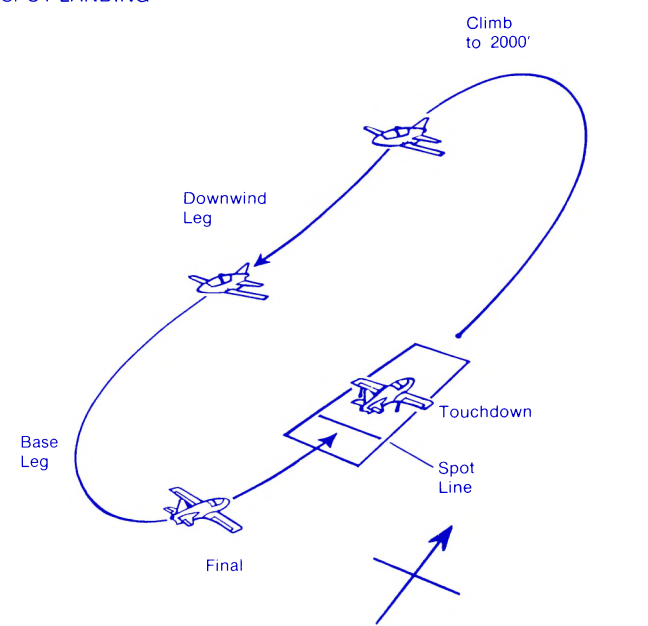
### Spot Landing

**Difficulty Factor:** 1.8

**Requirements:** After leaving the airstrip, the contestant must climb to at least 2,000', and land again on the airstrip from south to north. Scoring is based on where the wheels touch the runway. In a perfect score the wheels first touch at the spot line. There is a points penalty for first touching further north, and a double penalty for first touching further south. Note that the plane will invariably roll after the touch point, as it brakes to a stop. The final stopping point has NO effect on the score, provided the plane remains on the runway.

**Remarks:** This event requires precise control of a landing from 2,000', nothing more.

### SPOT LANDING



### Cuban Eight

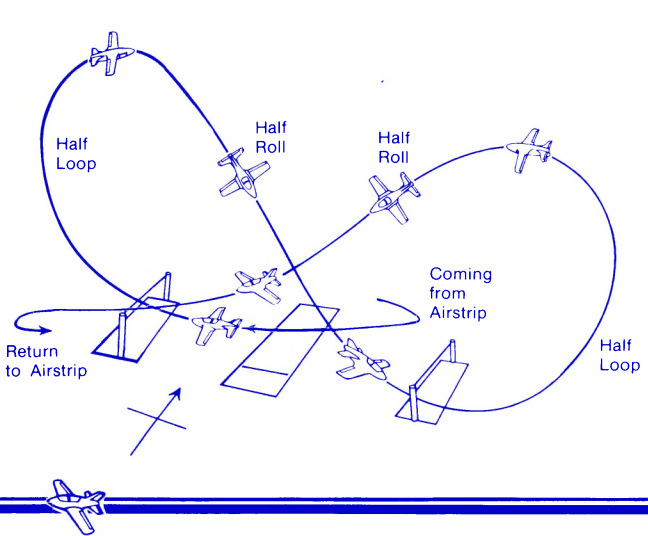
**Difficulty Factor:** 3.0

**Requirements:** After leaving the airstrip, the contestant must fly west through the west gate, half loop to cross above the gate, half roll on the descent to fly through the east gate, half loop to cross above that gate, and conclude with a half roll to fly west through the west gate again; then the contestant must return to the airstrip.

**Remarks:** This very difficult aerobatic manoeuvre requires absolute mastery of loops. As in a normal loop, descend through the first gate at high speed. After passing the gate you may wish to continue level for a distance before starting the loop. Once you're inverted and at the top of the loop only drop the nose 10° to 20° toward the downside and begin your roll as you descend toward the second gate. Repeat the process after passing the second gate, again, level flight after passing the gate, but before you start the second loop, can be valuable. Once you've mastered the event with wide loops you can work on beginning them sooner after you pass a gate.

### CUBAN EIGHT

(Must fly in the specified directions)



### Flameout Landing

**Difficulty Factor:** 2.0

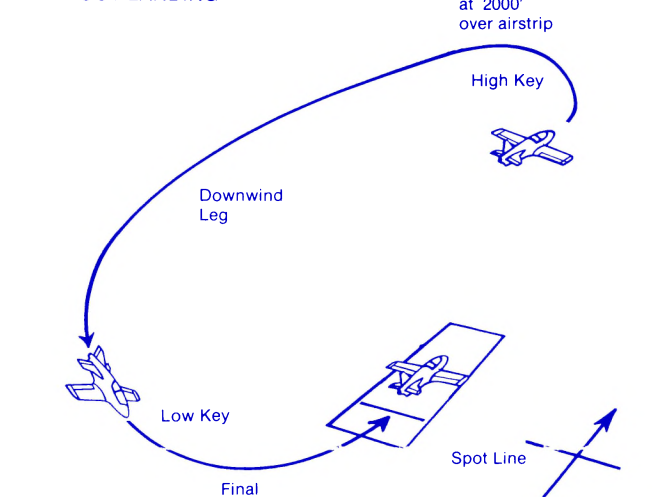
**Requirements:** After leaving the airstrip, the contestant must climb to at least 2000', set the engine to idle (press 0) while over the airstrip heading north, and glide to a landing on the airstrip. Landing requirements and scoring are the same as the Spot Landing, except that any use of the engine after it is turned off results in a very low score.

**Remarks:** An unpowered landing is similar to a regular landing. The point 2000' heading north over the airstrip is termed the "High Key". From here you spiral down 180° to the "Low Key" position. Low Key is normally about 1000' altitude, from which you make another 180° "Base Turn" toward the runway and land.

You control your altitude loss from High Key to Low Key by the width of your turn - the wider the turn, the longer it takes to reach the low key, and the more altitude you will lose.

The simulated flame-out (SFO) is more than just an aerobatic event — it's also an important skill for any sport pilot. During a pilot's flying career, it is quite likely that he will suffer an engine failure and need this skill to put his aircraft down safely in the nearest field or roadway.

### FLAME-OUT LANDING



### The Unlimited

This event allows you to select your own course from the six available (see pg. 5). You decide what race or aerobatic manoeuvres are required. You may want to sketch the event so everyone understands what's involved.

This means you can decide what aerobatics and/or racing paths are required. You decide the difficulty factor for the event too (select a value between 1.0 and 3.0, inclusive). The event can be timed or untimed, as you wish.

In real aerobatic competitions judges decide how well a pilot performed his maneuver. In the unlimited you and your friends can judge each other, rating performance on a scale from 1.0 (the lowest possible score) to 9.9 (a perfect score). In an event that is timed but not judged, always give contestants a judging score of 9.9. Note that an event can be both timed and judged if you wish.

If you start an unlimited event airborne, any time you cross the spot line from south to north during the event, it will immediately end. Therefore, we recommend you do not begin unlimited events airborne, but instead on the ground.

### Scoring

In all events a pilot is awarded a small consolation score for flying it correctly and finishing intact. You get a higher score for completing more difficult events. Additional bonuses are added for flying in more difficult weather conditions, and flying with more realistic aircraft performance. However, the dominant factor going into a high score (are the crucial factor when all other things are equal) is time. There are, of course, exceptions.

In the landing events (Spot Landing and Flame-out Landing) distance between the touchdown point and the spot line is critical to your score. Every inch counts here.

In the unlimited event with judging, the opinion of the judges can have a very significant effect, especially if the event is not timed. In a timed and judged event, the timer is slightly more important than the judges' decision.

Finally, in any event flown from an airborne start, time scores are adjusted for the starting and ending conditions. In addition, pilots flying from an airborne start suffer an extra penalty to their score.

If you crash or land without completing the event you score a small amount. If you fly the event wrong you can keep trying until you do it correctly. The only penalty is time lost. However, keep an eye on your fuel — the BD-5J consumes fuel like an Arab Sheik!

### The WGSP Pentathlon and Decathlon

The WGSP (World's Greatest Sport Pilot) AcroJet competition is a sum of any five events (the Pentathlon) or all ten events (the Decathlon). Since event scores are adjusted for difficulty, flying the more difficult events can result in the highest Pentathlon score.

### Major Bill

In addition to scores for the contestants, a score for "Major Bill" also appears. Major Bill is a U.S. Air Force graduate pilot and a U.S. Air Force fighter pilot, as well as being the President of MicroProse. Naturally, he loves MicroProse flight simulators and is happy to fly with you anytime. The scores you see represent his better performances in each event. How do you stack up against someone with 3000+ hours in hot military aircraft?

## THE BD-5J ACROJET DESIGN

### The BD-5J Design

The BD-5J is a very small, very fast, very high performance plane well suited to aerobatic and stunt flying. It is probably the smallest, least expensive aerobatic jet in the world. It is certainly a very demanding and dangerous plane to fly — recreational flyers beware!

The BD-5 was designed by Jim Bede of Bede Aircraft during 1971 and 1972 as an ultralight self-powered glider. The original powered design featured a small prop in the tail that could push the aircraft up to 212 mph. The plane was sold in kit form to flying enthusiasts. Although hundreds of kits were sold, about 40 have been completed and taken to the air.

The BD-5J is a jet-powered variant that first flew in 1973. It retains the famous "bullet" fuselage and retractable tricycle landing gear of the prop version. The wings were redesigned to hold a 50-gallon fuel tank for the turbojet, and strengthened to handle the greater weight of the jet version.

The BD-5J with its 220-lb thrust powerplant has an absolute maximum airspeed of 346 mph (controls lock in an uncontrollable dive at any higher speeds), stalls at 66 mph and climbs 3,200'/minute. The maximum ceiling is 30,000', but above 10,000' you'll need oxygen.

The BD-5 design is not a forgiving one. At least 24 accidents or incidents involving the aircraft are known, including seven fatal crashes. Of course, with kit-built versions, it is possible the fault lay in the construction, rather than the design. However takeoffs, landings, and low speed flying require particularly careful control of this temperamental and "high strung" thoroughbred.

Bede Aircraft is no longer in business making BD-5 kits. However, the fame and popularity of the design are so great that another firm is working on making the BD-5 available once more.

### The BD-5J Pilot: A Special Breed

The BD-5J is an extraordinarily small, fast, responsive and agile plane. One of the world's premier aerobatic pilots, Corkey Forno, owns and uses it for TV and movie stunt flying, and in various airshows.

Your BD-5J is a plane for the ultimate grandstander. Standing on the ground in the "flight line" it attracts lots of attention. As a BD-5J pilot, you'll be at the center of every hangar bull session! Just getting airborne and landing again requires plenty of care and skill — the BD-5 is a killer if not handled correctly. At altitude this jet-powered bullet can streak past traditional prop-powered biplanes and mono-planes. Performing aerobatics in the BD-5J tests the mettle of the best pilots. Its size and manoeuvrability allows a top pilot to perform difficult and precise manoeuvres such as a 16 point roll, or a vertical roll and tailside. In fact, the BD-5J may be the only jet in the world performing these aerobatics!

Perhaps the most memorable use of the BD-5J was by James Bond (007) to attack and destroy a secret installation at an airplane hanger — by flying inside the hanger with a BD-5J! This bit of daring-do was portrayed in the movie Octopussy, with Corkey at the controls. In fact, the BD-5J is an excellent choice for a clandestine "quick strike": it is tiny, very manoeuvrable and very fast. Unfortunately, the 50 gallon fuel tank allows only one to two hours flying time. Fortunately, such a small plane can land on a third of a mile of flat roadway for quick refueling. Then again, the secret agent needs to be an exceptional pilot to handle the BD-5J as well as Corkey Forno!

### BD-5J AcroJet Specifications

#### Dimensions:

Length: 14' 9"  
Wingspan: 17' 0"  
Height: 6' 1"  
Weight Empty: 430 lbs  
Maximum Gross Weight: 950 lbs  
Fuel Capacity: 50 gallons

#### Powerplant:

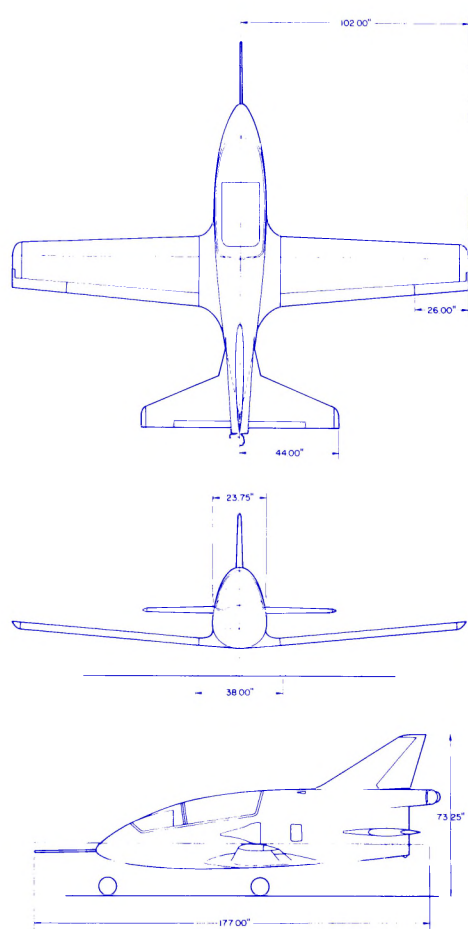
TRS-18 Ames Industrial Turbojet  
Thrust: 220 lbs  
Redline Exhaust Gas Temperature: 700° F  
Weight: 75 lbs  
Fuel Consumption: 38 gallons per hour at cruising speed

#### Performance:

Cruising Speed at 12,000': 233 mph  
Full Performance Airspeed: 301 mph  
Redline Airspeed: 346 mph  
Maximum Endurance: 2 hours, 15 minutes  
Stall Speed (flaps up): 66 mph  
Stall Speed (full flaps): 55 mph

#### Takeoff & Landing Performance:

Nosewheel liftoff: 65 mph  
Landing Pattern: 125 mph  
Final Approach: 100 mph  
Touchdown (flaps up): 80 mph  
Touchdown (20° flaps): 75 mph  
Touchdown (40° flaps): 70 mph



## SPORT AVIATION

### Yesterday

Daring individualism has been the hallmark of flying from the first powered flight at Kitty Hawk on December 17, 1903. Early aviators were often designers and mechanics as well as pilots. Structure and power plant were adjusted minutes before take-off. Flying was a profession for death-defying grandstanders and showmen, not unlike a circus. In 1914 Lincoln Beachey could be hired by fairs and cities to fly one loop for \$500, plus \$200 more for each additional loop he could perform. Beachey himself was killed a year later when his wings collapsed during a Split-S maneuver over San Francisco Bay. Pilots didn't have parachutes then.

World War I gave aircraft a practical purpose, but the tradition of aerobatic flying continued afterward with the 1920's barnstormers. This was fueled by the availability of war-trained pilots and war-surplus aircraft. Meanwhile, aircraft design was advancing by leaps and bounds. The boasts of designers and manufacturers inspired two types of racing: closed-circuit pylon races, and long cross-country or transcontinental races and challenges. The most famous were the Schneider Trophy for the fastest seaplane, and the Thompson Trophy for land-planes. Famous racing flyers such as Roscoe Turner were household words and front-page news. Hundreds of thousands of spectators turned out to see air races, their interest peaked by all too common crashes. In fact, the mortality rate was so high that in 1939 even the indefatigable Turner retired.

During World War II aerobatic flying again became a deadly game, now performed with high-speed monoplanes powered by giant 2000+ horsepower engines at speeds between 350 and 450 mph. In fact the late-war fighters now represent the apex of high-performance prop plane design. Those designs are rebuilt or copied today by "warbird" enthusiasts. After WWII surplus planes were again cheap — so cheap that many ordinary people could afford them. The number of trained flyers was also huge, and many wanted to keep flying. The result is an entire new generation of build-them-yourself airplane kits, low cost powered and unpowered designs, and a variety of low-cost factory-built products.

### Today

Modern "barnstormers" still exist, flying in airshows around the USA, and not infrequently performing stunts for TV and movie production. They don't crash as much, and are actually rather modest fellows, so you don't hear about them often. Frank Tallman and Corkey Forno are well-regarded men of this breed. Mr. Forno flies a BD-5J frequently, although he's flown over 140 other planes during his career.

Meanwhile at small airfields around the world private citizens purchase planes or build their own, and then fly them for pleasure. It is possible to buy a small aircraft or powered glider for the price of a good car, or to buy one in kit form for the price of a good motorcycle. In the USA sport flyers gather and communicate through the EAA (Experimental Aircraft Association). The EAA has divisions for vintage and classic aircraft, "warbirds", modern ultralightcraft, and the IAC (International Aerobatic Club). In August the EAA holds its annual convention in Oshkosh, Wisconsin, with hundreds of thousands driving and flying in from around the nation.

The IAC division of the EAA has chapters throughout the USA, and many of these sponsor local aerobatic competitions. Competitions are typically in four divisions, so that flyers of equivalent abilities can compete. In 1967 Count Aresti of Spain created a system for rating the difficulty of various aerobatic manoeuvres. In competition flyers perform routines composed of these manoeuvres, and are judged on their skill and precision.

Air races are still held in the USA, the most famous being the races in Reno, Nevada. The race has categories for various types of aircraft. The "unlimited" class of prop planes is the best known and most visible, especially since many of the planes are modified WWII fighters. Every two years an international competition of aerobatic flyers occurs among five-man and five-woman teams from each nation. The 1984 World Championship held in Bekescsaba, Hungary was won by Petr Jimus of Czechoslovakia (men's division) and Khalide Makagonov of the USSA (woman's division). However, the US men's team had the highest total score, and the US women's team had the second highest total. The next world championship will be in Cranfield, England, during August of 1986. The US National Competition to select the American team is in Sherman/Denison, Texas during September of 1985.

Competitive aerobatic flying is a small and often ignored sport, but probably the most demanding to them all — especially given it's high safety record (aerobatic flyers sense that a poor safety record would rapidly doom the sport!). Stunt pilot Frank Tallman's remarks on aerobatic flying are worth pondering: "... for me to get in and do an international course of aerobatics in a Chipmunk or a Pitts — forget it!" The Pitts Specials and Chipmunks are prop planes. Nobody thought to ask Frank what he thought about flying a 15' long aerobatic jet through ribbon gates!

## LOADING INSTRUCTIONS

**Cassette:** Connect cassette player as per user manual and rewind cassette on label side. Turn on the computer and press SHIFT and RUN/STOP keys together. Press PLAY on the cassette player and the program will load and run automatically.

**Disk:** Connect disk drive as per user manual. Insert disk, label side up, and turn on the drive. Turn on the computer and type LOAD \*\*\*\*\*8,1 and press RETURN; the disk will load and run automatically.

LOCK COLOUR CODE	UNLOCK CODE	LOCK COLOUR CODE	UNLOCK CODE
Azure	459	Olive	428
Beige	741	Ocher	847
Burgundy	025	Peach	384
Crimson	817	Rose	162
Emerald	356	Scarlet	630
Flame	283	Sienna	974
Gold	992	Tangerine	913
Indigo	538	Turquoise	290
Jade	464	Umbur	578
Lavender	170	Violet	024
Lemon	076	Viridian	757
Magenta	205	White	681
Maroon	751		



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SIMULATION • SOFTWARE

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