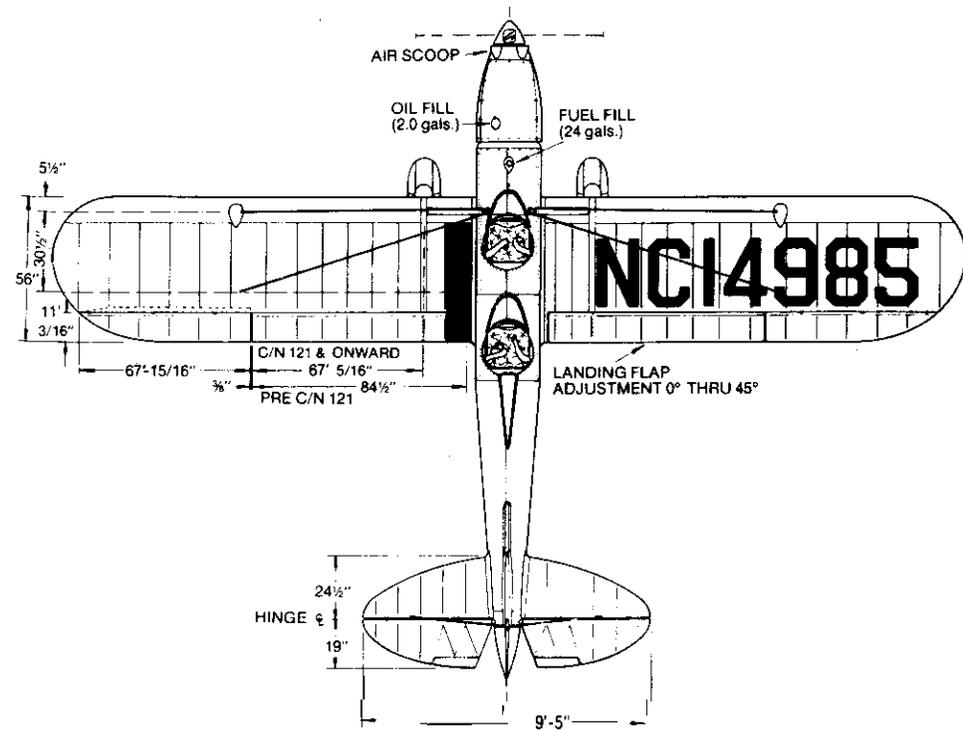


SOLO FLIGHT

OPERATIONS MANUAL



RYAN ST-A (Top View)
circa 1934

Dear Friend,
 I learned to fly at 14 when a Korea War Veteran took me up in an old L-5, ~~spider~~ aircraft. It was the same type of aircraft he flew during the conflict the real fly knew how to handle that bird! I was scared to death!! Anything that could be at the same time so scary, magnificent, thrilling, exciting, and wonderful had to be something wanted to do for the rest of my life!! With SOLO FLIGHT, my partner Sid Meier and his software guys, have brought to you some of that same exhilaration I feel every time I advance the throttles for takeoff in my A-37 Dragonfly.

When we started on SOLO FLIGHT, I told Sid it had to be as realistic in the feel of flying as it was in the fancy graphics he could put on the screen. I would gladly give up pretty colors and fancy building pictures for proper glide ratios, good stick feel, emergency procedures, and fun. The first week of development, I rented a C-172, and took Sid out to teach him to fly. Since I have taught more than 200 Air Force Lieutenants to fly, one brilliant software guru was a snap! SOLO FLIGHT is the result of much good design, much hard work, many rejections of the product by me because it didn't feel like flying, and a great desire to bring you the easiest to learn. MOST FUN, most like flying, most tested by real pilots, Primary Flight Training Simulator on the market today!!!



Special thanks to all the play testers including the 103rd TASS of the PA Air National Guard and for the software guys who made it all possible. We are very proud of their achievements in SOLO FLIGHT.

I'd say more but I know you are anxious to get airborne and so am I.

Bill Jr. is one of SOLO FLIGHT's greatest fans. At 12 and with considerably fewer flying hours than Dad's 3000 hours he is also one of the best SOLO FLIGHT pilots

around. Today, we are going to practice our SFO's (Simulated Flame Out Landings). We take turns climbing each other to various heights above the airfield, cutting the engines, and seeing if we can make the field. Then after that little warmup, we'll be ready for the real challenge- the MAIL PILOT GAME - we are going tough - the COMMAND level in COLORADO! We will have great fun with SOLO FLIGHT today and I know you will too!! GOOD FLYING TO YOU!!

Bill Stealey

FIGHTER PILOT
 PRESIDENT
 MICROPROSE SOFTWARE

TABLE OF CONTENTS

I PROGRAM MANUAL..	4
1. Introduction	4
2. Loading the Simulation.	4
3. Computer Chart	5
4. Options.	5
5. Mail Pilot Authorization Codes.	6
II FLIGHTMANUAL	7
A. FLIGHT TRAINING	7
1. Basic Flying	7
2. Instructor Pilot Option (C-64 and IBM only)	7
3. Contest (C-64 only)	7
4. View	8
5. Instruments	8
6. Flight Controls.	8
7. Mail Pilot Game	9
8. Emergencies	10
9. Weather..	11
10. State Maps	13
11. Flying Tips	21
B. INSTRUMENT TRAINING	22
1. Instrument Flying	22
2. Instrument Crosscheck	22
3. VOR Navigation	23
4. Instrument Approaches	25
5. Design Your Own Approach	29

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1. INTRODUCTION

SOLO FLIGHT IS AN EXCITING. REAL-TIME FLIGHT SIMULATOR.

You experience the fun and challenge of learning to fly a classic light aircraft design.

SOLO FLIGHT is a **Primary Flight Trainer simulation**, with training objectives similar to those of the T-37 "Tweet" flown by the USAF since 1962. Both novice and experienced pilots can learn or improve their skills in everything from basic flying *maneuvers* such as slow flight and normal VFR (Visual Flight Rules) landings, to dangerous bad weather and instrument flight.

SOLO FLIGHT includes an historical simulation game **Mail Pilot**, based on solo air-mail flying of the 1930's. As you hop from airfield to airfield, you'll face all the dangers of real cross-country flying, including deteriorating ceilings, changing cross-winds, mechanic & failures, may be even an overheating engine! Mail Pilot will put all your flying skills to the test.

Your aircraft in SOLO FLIGHT is based on the famous monoplanes of the late 1920's and early 1930's. notably the RYAN S-T series. These were similar to the "Spirit of St. Louis" flown by Charles Lindbergh across the Atlantic in 1927. The simulation reduces slightly some of the more dangerous characteristics of these famous planes, as well as adding a few more instruments to aid flight and navigation.

So, load your computer and get ready for a flying adventure with SOLO FLIGHT Have fun!

SPEECH SYNTHESIS is an added bonus in the C-64 version of SOLO FLIGHT. An on-board instructor talks you through a learning flight, and you actually hear radio messages. Text read-outs are included for computers without a speaker.

2. LOADING THE SIMULATION

REMEMBER, SOLO FLIGHT is JOYSTICK controlled and you MUST have a JOYSTICK to enjoy the simulation!! (IBM versions may be keyboard controlled).

A. COMMODORE 64/128

Turn on your disk drive and computer as described by the manufacturer. (For the C-128, establish the C-64 mode as described by the manufacturer.) Then place your diskette into your drive. Type: **LOAD ""**, 8.1. The program will boot automatically. Leave the disk in the drive.

IMPORTANT: Put the JOYSTICK in PORT #2 (TWO) -The Port toward the rear of the machine. Otherwise you will not be able to control the aircraft

B. APPLE II Family

Place the diskette in your disk drive and turn on the computer. The disk will boot automatically. Leave the disk in the drive. (Make sure the caps-lock is on if your Apple has lower case.)

C. IBM PC (Requires Color Card)

Place the diskette in your disk drive and turn on the computer. The disk will boot automatically. Leave the disk in the drive. (W/O Joystick, use the arrow keys to fly the aircraft and return key for slipping the aircraft.)

D. ATARI 400/600/800/1200/XL/XE Series

REQUIRES: 48 K RAM

REMOVE all cartridges.

Place the disk in your disk drive and turn on the computer. The program will boot automatically. Leave the disk in the drive.

IMPORTANT: After the simulation has loaded, you will be shown the first option screen with a demo timer counting down at the bottom of the screen. You must start the simulation by pressing the **START** key (see computer chart) **before** the demo timer reaches 0. If the demo timer reaches 0, the simulation will begin in demo mode and **you will not be able to control the aircraft!**

3. COMPUTER CHART

SOLO FLIGHT is available for Commodore 64, Apple, IBM PC, and Atari computers. To accommodate the differences in keyboards, the following conventions are used in the documentation.

Terms used in this manual	C64	Apple	Atari	IBM
OPTION	F1	1	OPTION	1
SELECT	F3	2	SELECT	2
START	F7	3	START	ESCAPE
Looking Out The Cockpit				
Len View		- or A	+	A
Right View	CRSR =	→ or S	*	S
Forward View	↑	↑ or W	-	w
Backward View	CRSR ↑↓	↓ or Z	=	Z

4. OPTIONS

A series of option screens lets you select the type of flight (practice or mail pilot) and the state you will fly across. Press SELECT or the appropriate number key to select the option. To restart the options selection, press the **START** key.

Flying Practice lets you select the situation. Clear Weather is the easiest, Landing starts your plane on the "short final" for landing practice, Windy Weather is just that (see page 7 for the special C-64 contest version of this option), IFR (Instrument Flight Rules) gives you low clouds, and *Night* (not available in some versions) lets you practice night flying.

Mail Run Game lets you select the level of challenge from Student (easiest) to *Command Pilot* (most difficult).

5. MAIL PILOT AUTHORIZATION CODES

IMPORTANT READ CAREFULLY

In the mail pilot game, you will be asked to enter your mail carrier security code. To determine the correct code, read the security code # displayed by the computer when it asks for the authorization code. Then go to the countercode tables (found in the SEPARATE CODETABLES LOCATED ON EACH PAGE OF THE INSTRUCTIONS).

Locate the code # given by the computer. Located directly beneath the computer generated code # is the countercode response. Type the countercode into the computer and press the RETURN key. If an incorrect countercode is entered and the RETURN key has not yet been pressed, the player may reenter the correct countercode and then press the RETURN key. The last value entered before the RETURN key is pressed is taken to be the countercode.

FOR EXAMPLE: If your Commodore64 computer displays "ENTER MAIL CARRIER SECURITY CODE (1)", you would consult the code boxes located throughout this manual. The box containing the number "1" is found below. Match the number and the computer type to determine the correct code response. In this case "H" is the correct response. Type the letter "H" and press RETURN. For your APPLE, you would press "G" and RETURN,

MAIL CARRIER SECURITY CODE OR ACCOUNT NO.			
SECURITY CODE / ACCT. NO.	1	2	3
RESPONSE C-64	H	E	L
APPLE	G	F	C
IBM	T	I	F
ATARI	A	D	G

IMPORTANT: If you do not enter the CORRECT CODE you will be unable to control the simulation.



Charles A. Lindbergh's "Spirit of St. Louis"

II FLIGHT MANUAL

A. FLIGHT TRAINING

MAIL CARRIER SECURITY CODE OR ACCOUNT NO.			
SECURITY CODE / ACCT. NO.	4	5	6
C-64	A	M	D
APPLE	G	L	F
IBM	S	M	P
ATARI	J	M	P

1. BASIC FLYING

Two controls are used for most basic flying — the control stick or yoke and the throttle. The joystick (yoke) changes the attitude of your aircraft; the throttle affects your speed. Use the joystick to make your plane turn, climb, and dive. Holding the stick to the right causes the plane to bank (tilt) to the right; when the plane is banked right it will turn to the right. Note that when you center the joystick, the plane will remain banked and will continue turning. Bring the plane back to a level attitude by pushing the stick opposite the direction of bank. Pushing forward (toward your screen) on the stick will cause the nose to go down and your plane will dive. Pulling back on the stick will bring your nose up. The throttle controls the amount of power generated by your engine. Maximum power is required when taking off and climbing, somewhat less power is needed for cruising, and low power is generally sufficient for landing.

Remember that there is a relationship between the pitch attitude (nose up) and the amount of power required to hold level flight. At low airspeeds, significantly more nose up (more pitch or angle of attack) is required for level flight. Many small airplane pilots use pitch to control airspeed and power to control altitude. Jet pilots, on the other hand, are taught to use pitch to establish the right glide path to touchdown. They use the throttle to control airspeed. Both approaches to altitude and airspeed control are correct and both are taking advantage of the interrelationships between pitch attitude, angle of attack, power setting, and airspeed. No change can be made to one of these factors without influencing the others. Generally, when the nose comes up, airspeed goes down, and vice-versa. Power changes can be used to modify the effect of pitch changes. Alternatively, when power is reduced, the nose starts down unless stick back pressure is applied. Power up, and the nose will start back up. To achieve perfect aircraft control on final approach, all of these factors must be taken into account so that constant airspeed and descent rate can be established and maintained to touchdown. Your SOLO FLIGHT aircraft has all of these characteristics built in. It will be your job to master them so you can fly and land under all flying conditions.

2. INSTRUCTOR OPTION (not available on APPLE II)

When you select Flying Practice in Clear Weather, in Kansas and some other states you will have a flying instructor aboard to guide you. The instructor gives you assistance and directions with text messages, and (in the C-64 version only) actual speech. After you complete a flight and landing the instructor automatically signs off.

You can drop your instructor by pressing the "I" key.

3. CONTEST MODE (C-64 only instead of windy landing option)

The CONTEST mode allows multiple players to compete in completing a tricky cross-wind landing. Each landing is scored based on how slowly and gently the plane is landed.

4. VIEW

The top half of the flight screen shows your plane and the local terrain highlights. If you are at a low altitude your shadow will be visible on the ground. Airports are black, VOR towers, farms and mountains are white. If you fly into or above the clouds, ground objects will not be visible. Generally the view is to the front; you may look to the side or behind you using the appropriate commands. (see COMMANDS)

5. INSTRUMENTS (see centerfold diagrams)

The bottom half of the screen shows your cockpit flight instruments.

Throttle Indicator shows your current engine power setting. The higher your engine power, the faster you can go. and the faster you consume fuel.

Airspeed Indicator shows your current airspeed in knots
(1 knot = 1.136 mph).

Attitude & Artificial Horizon Indicator shows the attitude of your aircraft in relation to level flight.

Altimeter shows your current altitude in feet, from sea level. Beware in Washington and Colorado-- the ground levels are significantly above sea level.

VI (Vertical Velocity Indicator) shows the rate your plane is changing altitude up (climbing) or down (diving).

Flaps Indicator shows whether flaps are up (0") or down (20" or 40").

Flaps down slows the plane and provides extra lift, reducing your stall speed (this makes slower landings possible).

VOR Radial Indicator represents a course from the VOR station to your current position. Flying a heading 180" from the radial will take you directly to the VOR.

DME (Distance Measuring Equipment) (not available in the Apple II version) shows the number of nautical miles from the VOR station to your aircraft.

Magnetic Compass shows what direction you are flying. In the Apple II version you also have a digital **Heading Indicator** that shows the exact direction of flight (0/360" is North, 90" is East, 180" is South, 270" is West).

ILS Glideolope indicates your plane's relationship to the airport glide slope, as a landing aid. See instrument flying for details.

Fuel Gauge indicates the amount of fuel you have remaining.

Brake Light shows when your landing gear brakes are on.

Landing Gear Lights show when your landing gear is lowered.

Engine Overheat Light shows when your engine is running dangerously hot.

Time Elapsed Indicator (Apple II only) shows time elapsed-important when scoring your success as a mail pilot.

Pitch Indicator (Apple II only) shows how far your nose is pointing up (positive values) or down (negative values).

6. FLIGHT CONTROLS

Joystick Climb, Dive & Bank. The joystick (yoke) is your basic control (see BASIC FLYING for details). In the IBM version only, you can use keyboard cursor controls instead of a joystick.

Joystick Button: Slip Left or Right. Pressing this button while turning allows you to "slip" straight down.

O-9: throttle Setting. Press 0 to turn off the engine. Numbers through 9 set the throttle from the lowest to highest engine power.

L: Landing Gear. Press L to raise and lower your landing gear.

F: Flaps. Press F to change your flaps setting.

B: Brakes. Press B to turn on and off your landing gear brakes.

E: Emergency. Press E to create an emergency equipment failure; this feature helps you practice dealing with real failures.

I: Instructor Off. This turns off the practice flight instructor (if you prefer to fly without one).

J: Joystick Adjust (Apple only). Center your joystick and THEN press J to align the game to your joystick.

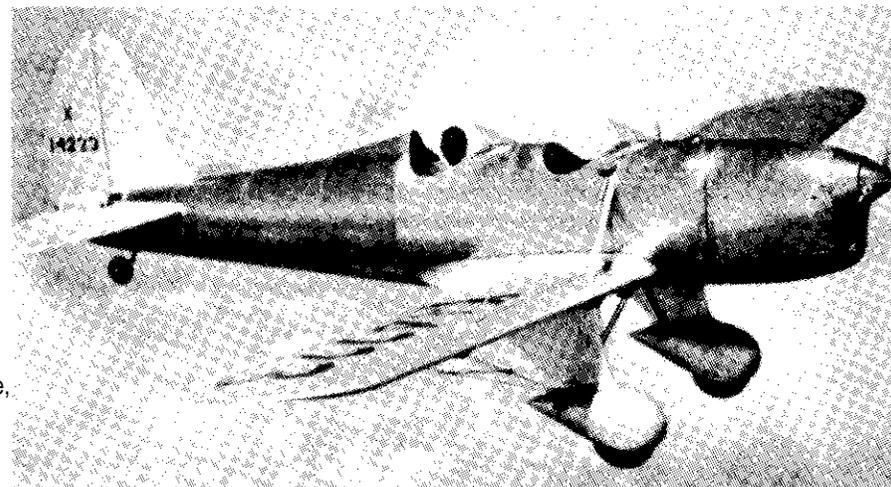
V: Volume On/Off (IBM only). Press V to turn engine noise off and on.

Y: Accelerated Time (IBM only). Press Y to accelerate the passage of time. Press it again to return to normal.

P: Pause. Press P to freeze the game. Press any other key to continue.

Viewing. To look left, right, and rearward see the Computer Chart on page 5.

Start. (see Computer Chart on page 5) this key restarts the game with the option menus.



ST "Sport Trainer", 1934-37

7. MAIL PILOT GAME

The mail pilot game tests your flying skills and judgment. Your task is to deliver five bags of mail to their destinations in the least amount of time. Once you have selected the Mail Pilot game, a map will be displayed. (Map will not be displayed on cassette versions.)

A. DEPARTURE

Press **START** to continue. You may be asked to enter your Mail Security Code. If so, follow the instructions in Section 1.5 of this manual. (If you were not asked for your code, you will be asked after your first landing. Follow the same instructions.)

Now you must make decisions on how many destinations and mail bags you will accept on your first mission. Follow the instructions on the screen to get destination assignments. The destination(s) will be displayed on the screen under "MAIL FOR:". You may load up as much mail as you like, however, each bag adds to the weight of your plane and increases the difficulty of flying. One or two bags is recommended.

Now choose the amount of fuel you want to carry. Remember fuel adds weight. The more weight the more sluggishly the aircraft responds. On a hot day, at high altitudes, in Colorado you may not be able to get off the ground!! It's your choice!

Press START and you will be shown the map again. Take some time here to note which landmarks you will be passing, VOR bearings, nearby airports, etc. This information can be extremely valuable if conditions change while enroute. When you are ready to take off, press START again to begin your flight.

B. ENROUTE

As the game progresses, the weather will gradually deteriorate. Winds will get stronger, clouds may come in, and turbulence may develop. At the higher difficulty levels your plane is also prone to mechanical and instrument failure. Your engine may overheat and various instruments may become inoperative. All malfunctions are repaired when you land at an airport.

C. ARRIVAL AND SCORING

In this simulation flight time between airports is shortened considerably. Actual flight takes much longer.

When you land and stop at your destination airport, you are scored for your performance over that leg of the mail route. You score points based on your landing skill (slower landings score higher, as do landings with gentle touchdowns). You also score points for the difficulty level you selected initially, which state map you selected (Colorado and Washington give the highest scores, Kansas the lowest), and how much time you took to deliver the mail.

If you crash, you will be told why. *Crash Landing* means you hit the ground too hard, or forgot to lower your landing gear. *Missed Runway* means you landed off the runway, or rolled off it before you came to a stop. *Ground Loop* means you turned your plane too sharply while taxiing. *Stalled* means you flew too slowly.

You will also see a map displaying the route you took. This allows you to review your navigation.

Finally, you can load additional mail and/or fuel, and plan your next flight. The game ends when you deliver five bags of mail, or when you crash.

8. EMERGENCIES

At the more advanced difficulty levels your aircraft is prone to instrument and mechanical failure. If the temperature light begins to blink, your engine is overheating and will cut out shortly. Find a place to land. Your altimeter, airspeed indicator, digital heading indicator, and VOR indicators may also malfunction and register zero readings. The artificial horizon could also cease functioning. Landing at any airport will repair your aircraft

Remember, there are three basic rules of flying during an aircraft emergency.

1. Maintain aircraft control.
2. Analyze the situation and take proper action.
3. Land as soon as conditions permit.

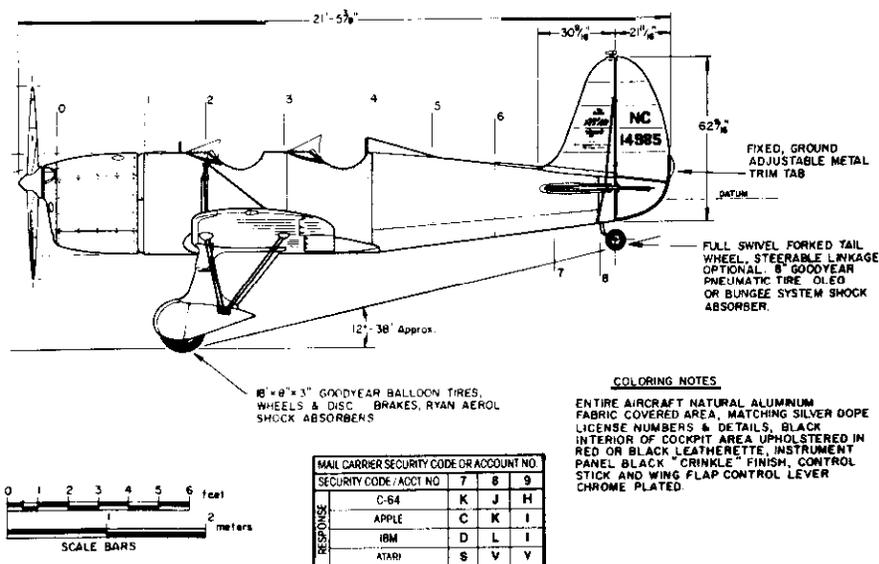
Most aircraft emergencies do not require instant reaction (exclusive an engine failure on takeoff leg). They do require careful planning. Performance instrument failure can be overcome through the use of the remaining instruments. Engine failure can be managed by maintaining sufficient inflight altitude to make a dead stick landing to an emergency airfield along your route of flight. (Your SOLO FLIGHT aircraft has approximately a 9 to 1 glide ratio.)

The most difficult emergencies are multiple emergencies where problems compound themselves. Losing your attitude indicator in instrument conditions can be one of the most frightening occurrences in real flying. Combine this emergency with engine failure and smoke in the cockpit, and the pilot would be happy to use his silk elevator (parachute) to get his body back on the ground in one piece!

Emergency procedures may be practiced through the use of the "E" key. Multiple actuations of the "E" key will cycle the program through all the emergencies possible in the simulation.

9. WEATHER

The current weather conditions are displayed at the bottom of the screen: wind direction and speed, cloud ceiling in feet, and visibility in miles. Under windy conditions, landing your aircraft becomes tricky, especially if the wind is blowing across the runway. Use less flaps, higher airspeeds, and aircraft slips to compensate for winds. Low clouds often require instrument flying, although you may choose to fly above the clouds.



STANDARD EQUIPMENT

All models of the 1937 Series are exceptionally well equipped and include many features as standard which would otherwise cost \$500 to \$700 as "extras."

Wing flaps with new, instant lever control.

Tab balance controls.

Wheel pants, wing fillets and fairing throughout.

N.A.C.A. in-line engine cowling.

Full swiveling, pneumatic tail wheel.

Tail wheel swivel lock, controllable from cockpit.

Full airwheels.

Wheel brakes, controlled from both cockpits.

Long stroke, oleo type shock absorbers.

Wiring for position lights.

Baggage compartment.

Sesame combination lock.

Direct reading fuel gauge.

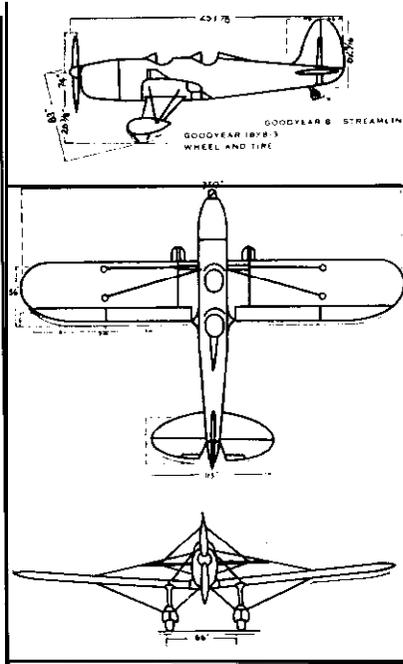
Reserve fuel supply system.

Complete set dual controls.

Impulse hand starter.

Altimeter.

Tachometer.



Compass.

Airspeed indicator.

Oil pressure gauge.

Oil temperature gauge.

First aid kit.

Fire extinguisher.

Tool kit.

Aircraft and Engine Log Book.

Aircraft and Engine Instruction Manuals.

Parachute type seats.

Attractive cockpit upholstery, including thick cushions and back pads.

FOREIGN SHIPMENT

All models of the new Ryan S-T series when boxed for foreign shipment are carefully treated with a special cosmoline coating and wrapped as an extra preventative against salt water exposure. Wings and tail surfaces are disassembled and the plane and motor placed in one box of the following dimensions:

	English	Metric
Length	20' 4"	6.20 M
Width	6' 3"	1.91 M
Height	4' 8"	1.42 M
Total Weight	2400 lbs.	1088 kg.
Total Content	593 cu. ft.	16.8 M ³

SPECIFICATIONS AND PERFORMANCE

Models S-T, S-T-A, and S-T-A Special

Model	S-T	S-T-A	S-T-A Special
Engine—Menasco	B-4	C-4	C-4-S (Supercharged)
Horsepower	95 H.P. at 1975 R.P.M.	125 H.P. at 2175 R.P.M.	150 H.P. at 2275 R.P.M.
Wing Span	30'	30'	30'
Length Overall	21' 5 3/8"	21' 5 3/8"	21' 5 3/8"
Height Overall	6' 11"	6' 11"	6' 11"
Wing Area	124 sq. ft.	124 sq. ft.	124 sq. ft.
Fuel Capacity	24 gal.	24 gal.	24 gal.
Fuel Consumption per hr.	7 gal.	8 gal.	8.5 gal.
Propeller Clearance—Level	23.75"	23.75"	22.25"
Airfoil Section	N.A.C.A. 2412	N.A.C.A. 2412	N.A.C.A. 2412
Wheel Tread	66"	66"	66"
Tire Size (Air wheels)	18 x 8-3	18 x 8-3	18 x 8-3
Tail Wheel Size	8" Pneumatic	8" Pneumatic	8" Pneumatic
Weight Empty	1023 lbs.	1023 lbs.	1058 lbs.
Useful Load	552 lbs.	552 lbs.	517 lbs.
Gross Load (Maximum)	1575 lbs.	1575 lbs.	1575 lbs.
Range (Cruising)	400 mi.	350 mi.	350 mi.
Maximum Speed at Sea Level	140 M.P.H.	150 M.P.H.	160 M.P.H.
Cruising Speed at 2000 ft.	120 M.P.H.	127 M.P.H.	135 M.P.H.
Rate of Climb (Sea Level)	850 ft. min.	1200 ft. min.	1400 ft. min.
Service Ceiling	15,500 ft.	17,500 ft.	21,000 ft.
Landing Speed	42 M.P.H.	42 M.P.H.	42 M.P.H.
Landing Speed with Flaps Up	50 M.P.H.	50 M.P.H.	50 M.P.H.
Take-off Run with Full Load	190 yds.	175 yds.	145 yds.

RYAN AERONAUTICAL COMPANY

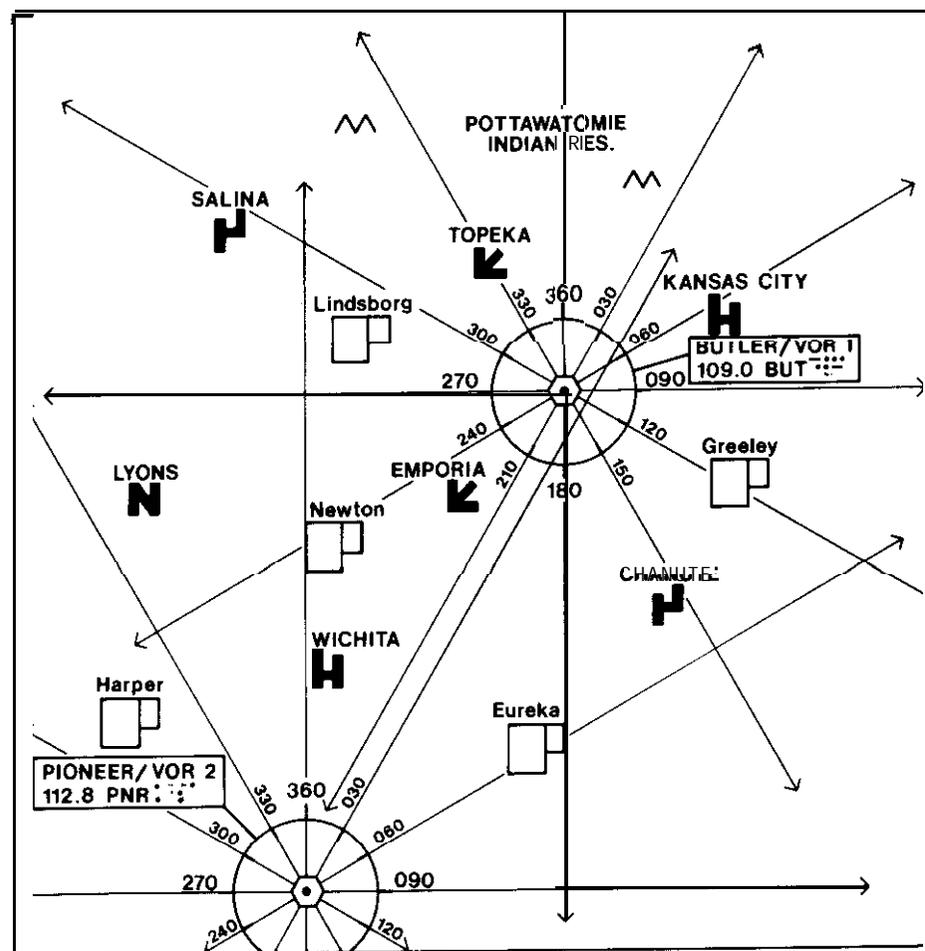
LINDBERGH FIELD, SAN DIEGO, CALIFORNIA
CABLE ADDRESS "RYANCO"

1937 RYAN BROCHURE

10. STATE MAPS

KANSAS: Kansas is a nice flat state, ideal for novice flyers. Wichita and Kansas City have airports with long, wide runways. There are also many nice cornfields and mysterious Indian pyramids to fly over. VOR 1/VOR 2 bearings for Kansas are: Wichita - 222/001, Lyons - 252/336, Emporia - 225/022 Chanute - 154/052, Salina - 295/353, Topeka - 330/016, Kansas City - 065/036.

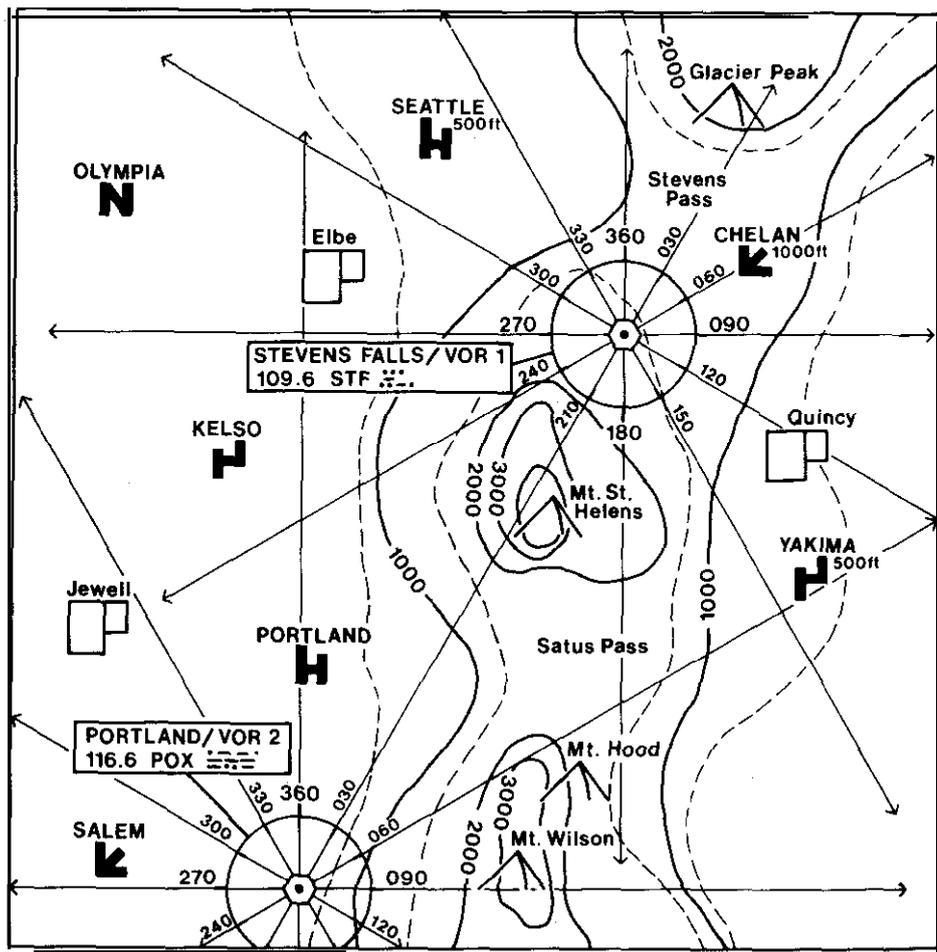
KANSAS



MAIL CARRIER SECURITY CODE OR ACCOUNT NO.				
SECURITY CODE	ACCT NO.	10	11	12
C-64	F	N	O	
APPLE	G	T	E	
IBM	P	M	N	
ATARI	C	F	B	

WASHINGTON/OREGON: Washington has a mountain range separating the coastal cities from Chelan and Yakima. Some of the mountains are up to 4000 feet high although the two mountain passes can be traversed at 2000-2500 feet. Three of the Washington airports are also elevated. Navigational information for Washington: Portland - 223/001, Salem 224/278, Kelso - 2511350, Olympia - 264/344, Seattle (500 feet elevation) - 314/010, Chelan (1000 feet) - 0601035, Yakima (500 feet) - 142/059.

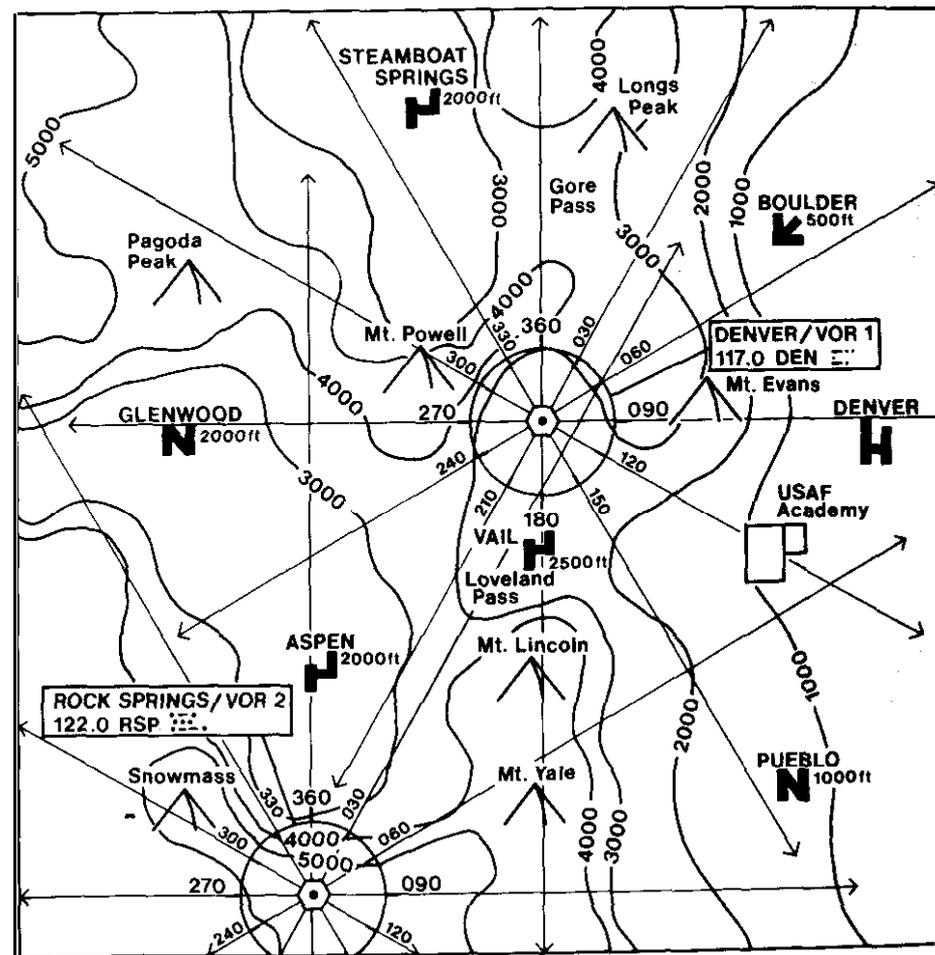
WASHINGTON



MAIL CARRIER SECURITY CODE OR ACCOUNT NO.			
SECURITY CODE / ACCT. NO.	13	14	15
C-64	D	O	P
APPLE	M	Y	R
IBM	F	T	B
ATARI	E	H	K

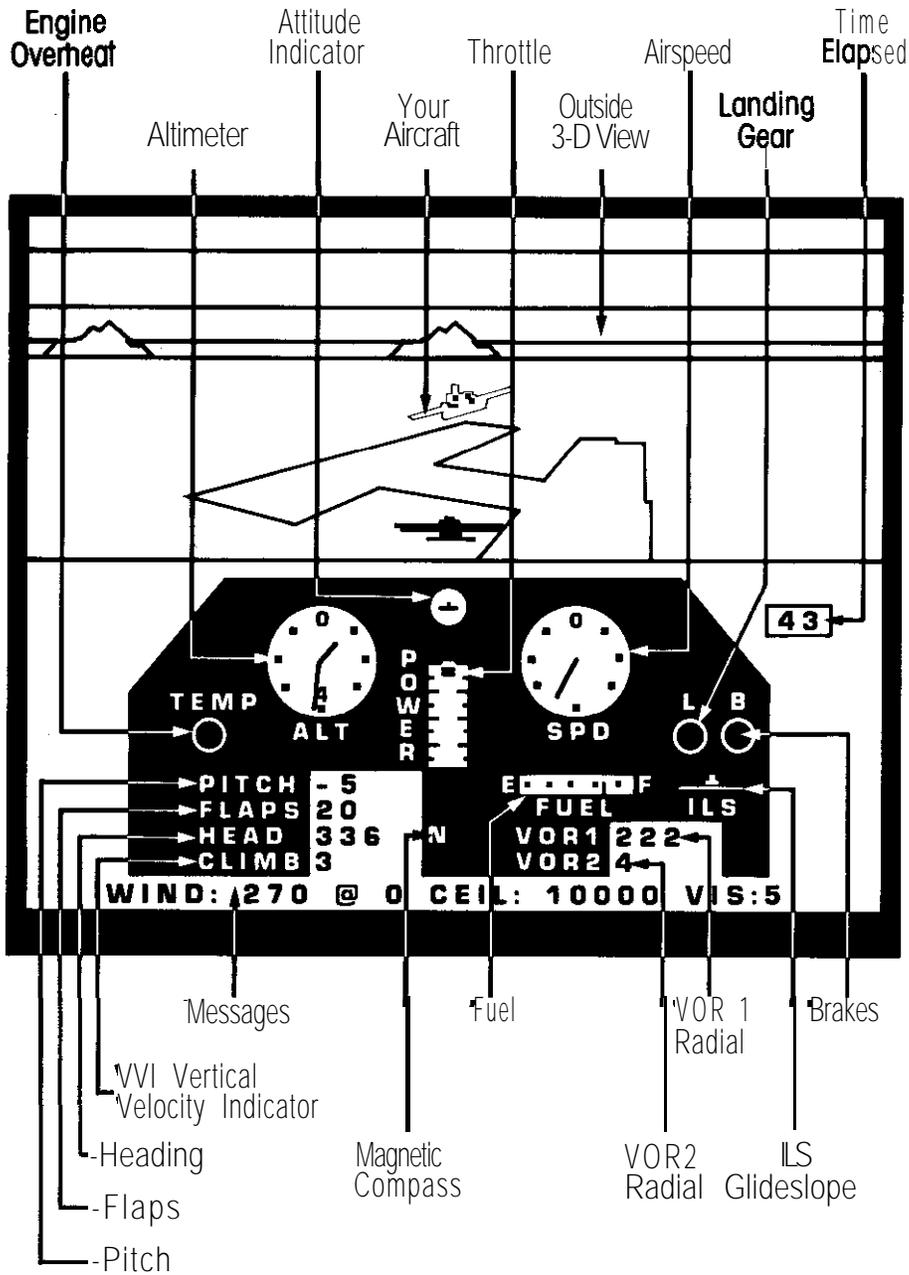
COLORADO: Flying between the small airstrips nestled in the Rocky Mountain Valleys of Colorado is the ultimate challenge for a mail pilot. Aspen (2000 feet elevation) - 223/001, Pueblo (1000 feet) - 143/074, Glenwood (2000 feet) - 264/343, Vail (2500 feet) - 184/030, Denver - 098/050, Boulder (500 feet) - 0531037, Steamboat (2000 feet) - 334/008

COLORADO



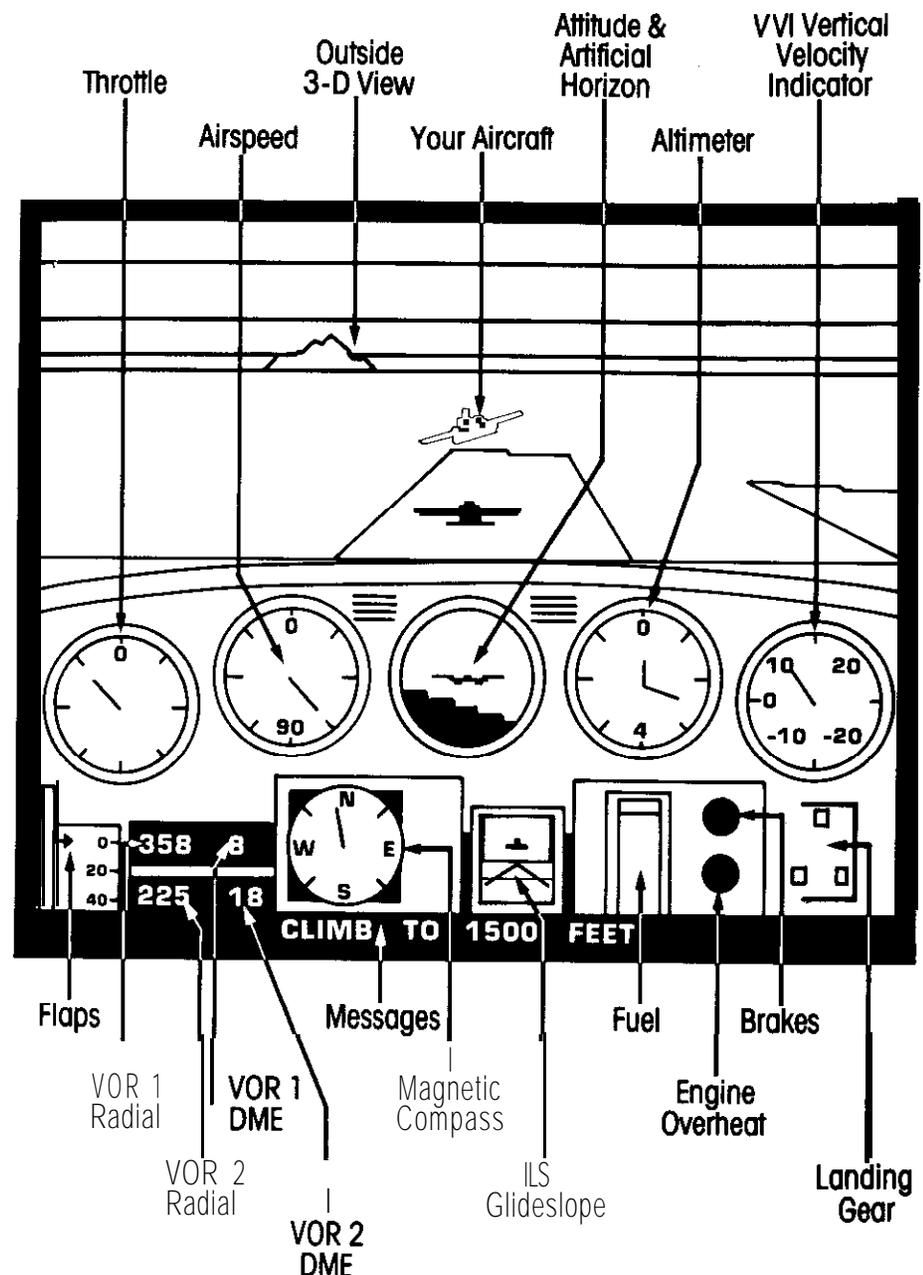
MAIL CARRIER SECURITY CODE OR ACCOUNT NO.			
SECURITY CODE / ACCT. NO.	16	17	18
C-64	E	O	P
APPLE	N	R	R
IBM	O	E	K
ATARI	N	O	T

SOLO FLIGHT



APPLE

COCKPIT LAYOUT

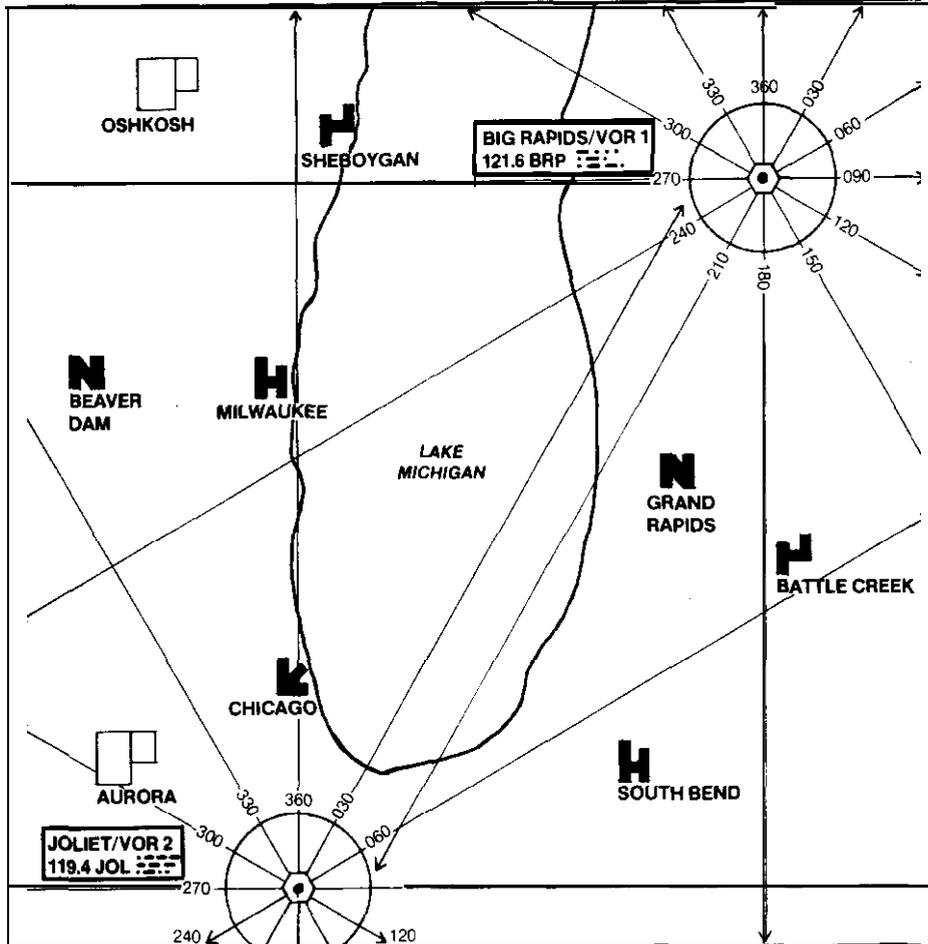


C-64, IBM and ATARI

MICHIGAN: Flying near the Great Lakes may seem boring-until you experience rapidly shifting winds along the coastline, or land/water generated fogbanks!

VOR1/VOR2 Navigational bearings are: Battle Creek 178/58, Beaver Dam 259/338. Chicago 224/356, Grand Rapids 204/138, Milwaukee 246/357, Sheboygan 275/2. South Bend 194/72.

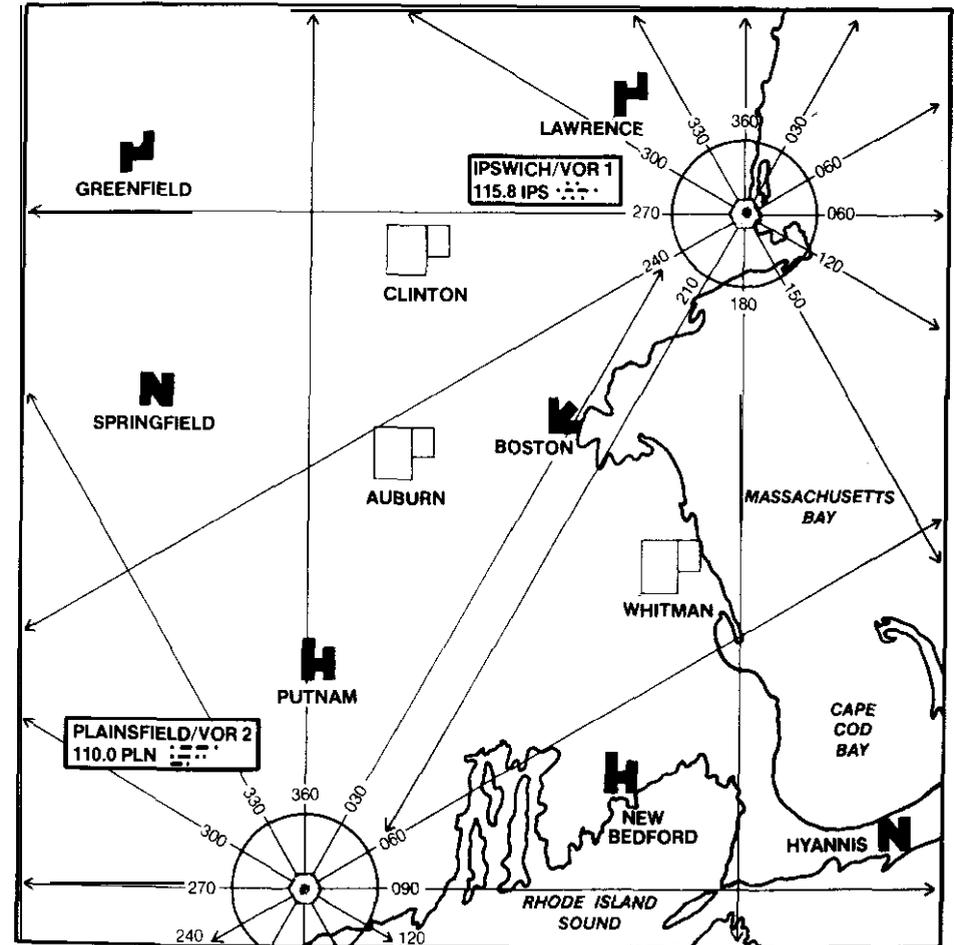
MICHIGAN



MASSACHUSETTS: The "Bay State" is a heavily wooded and gradually rolling landscape. Pliers should beware of wind and weather changes caused by Atlantic ocean air meeting the coastline.

VOR1/VOR2 Navigational Bearings are: Boston 219/30, Greenfield 273/344, Hyannis 168/86, Lawrence 304/21. New Bedford 194/72, Putnam 233/358, Springfield 252/340.

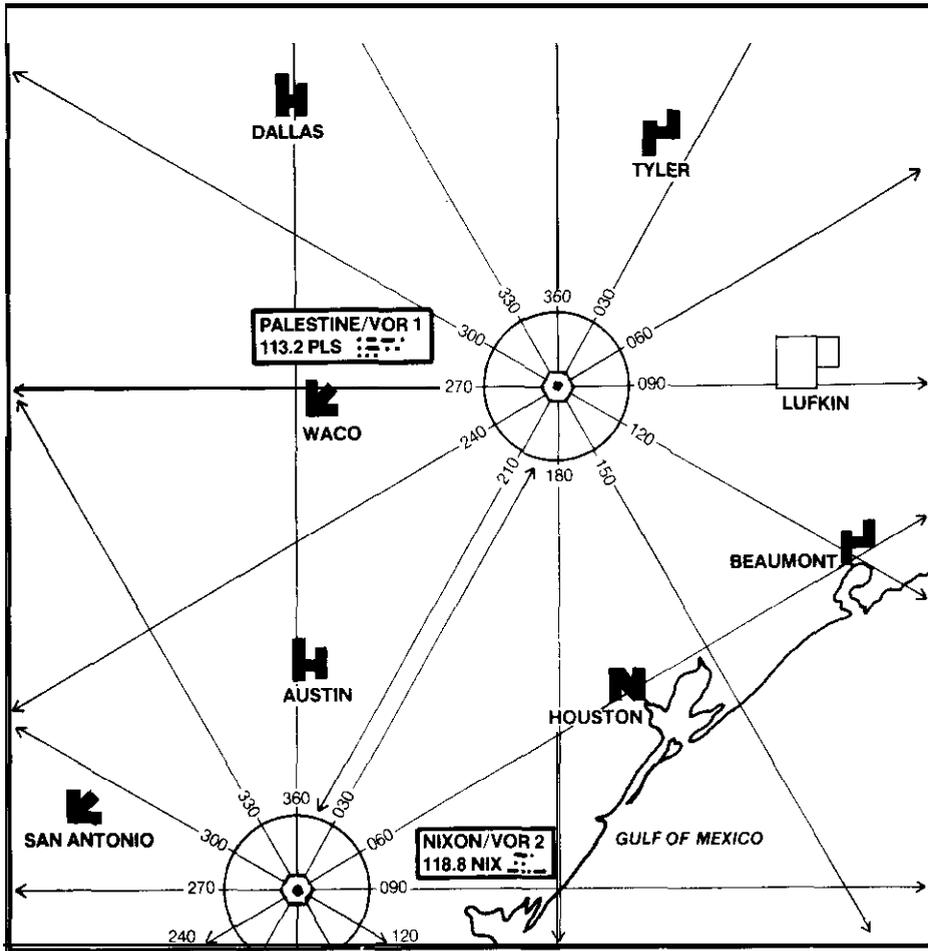
MASSACHUSETTS



TEXAS: Texas is a state of great distances, flatlands, and high winds. Be sure you're confident with your crosswinds landings skill before failing the mail in Texas.

VOR1/VOR2 Navigational Bearings are: Austin 223/358, Beaumont 123/60, Dallas 313/358, Houston 171/60, San Antonio 229/286, Tyler 21/26. Waco 263/1.

TEXAS



11. FLYING TIPS

A. TAKE OFF

Taxi to the end of the runway (throttle 2-3). Stop and turn to face down the runway. Set takeoff flaps, (normally 20%). Apply maximum power. When your speed reaches 85 knots (80 with 20 degrees of flaps) pull back on the stick until your pitch is plus 8-9 degrees. When you are safely airborne, with a positive WI, retract your landing gear. Above five hundred feet, retract your flaps. (Notice that your lift is decreased as flaps are raised. Additional pitch is required to maintain the same climb rate.) When you reach your desired cruising altitude, reduce power and level off.

B. LANDING

Landing your airplane is probably the most difficult skill to master. As you approach the destination airport, line the aircraft up with the desired runway as early as possible. Approach the airport at 1000 to 1500 feet above field elevation. When the ILS becomes active, climb or descend to center yourself on the ILS display. Lower your landing gear, reduce your throttle to 4, and adjust your pitch to maintain a descent rate of -4(00) or -5(00) feet per minute. As you approach the runway, reduce your descent rate by slowly raising the nose of the aircraft. Airspeed control is extremely critical. Too much airspeed and the aircraft will float off the other end of the runway or not stop in the available runway. Too little airspeed, and the aircraft will stall during the flare and touchdown. With 20% flaps, the aircraft should be flown down final at approximately 70 knots. With no flaps, increase final airspeed by 10 knots. Full flaps allow a 10 knot reduction in final airspeed and are handy for short field takeoffs and landings.

If you end up high on final, reduce power, lower full flaps and lower your nose to maintain 65-70 knots. A slip into the wind may also allow the aircraft to get rid of excess altitude. To slip, align the aircraft with the landing runway, bank into the prevailing wind, and hold top rudder. (Top rudder is available by holding down the fire button on the joystick.)

If you are coming in too low, apply a little more throttle and increase your pitch. This is known as a dragged in approach and is not safe. If your aircraft lost power during a dragged in final, the aircraft would sink into the earth shortly after power loss, with no chance to glide to the runway.

Just before you touch down, pull back slightly on the stick to reduce your descent rate. Smoothly reduce power and attempt to reach zero descent rate just as the wheels touch the runway. Be careful however, if you flew a low dragged in approach. The high pitch attitude and power settings required for such an approach means that power reduction may result in an over rapid airspeed loss and stall before the aircraft touches down. With the proper glide slope, raising the nose and reducing the power in the flare will result in a 10 knot reduction of airspeed from final approach airspeed to touchdown speed and a zero sink rate at touchdown! In pilot talk, that landing has been greased. Once the aircraft is on the runway, cut your power (hit the zero digit on the keyboard) and apply the brakes, (hit "B"). Attempt to stop the aircraft before the end of the runway. (On some of the shorter runways this will be difficult unless you fly a short field approach [full flaps, 10 knots low on airspeed and land very close to the approach end of the runway.]

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APPLE	Q	T	U
IBM	P	I	O
ATARI	W	Z	D

Being able to land your aircraft under any conditions at any airport in the world is part of the thrill of being a great pilot. Practice your landings and don't be afraid to "take it around" if the landing does not look right. Remember, the only good landings are those you can walk away from!! (Use the Practice/Landing Option if you are having trouble with landings.)

CAUTIONS: Take heed of the following cautions, especially at the advanced difficulty levels.

1. Don't make sharp or high speed turns while taxiing. Your landing gear struts are delicate and you are liable to ground loop.
2. Don't lose your airspeed and stall when attempting a slow landing. Use your flaps to lower stall airspeed.
3. Plan your route on the map before taking off. A sudden lowering of the clouds or an emergency may hide familiar landmarks or require an immediate landing.
4. Don't run your engine at full power for too long: overheating is likely to occur.
5. Don't overload the aircraft. With a heavy mail and fuel load, your aircraft will be very sluggish. The aircraft will have a hard time taking off from elevated Colorado airports, and will require longer landing distances.

B. INSTRUMENT TRAINING

1. INSTRUMENT FLYING

Instrument flying is the most difficult flying that pilots accomplish. Instrument pilots must be able to accomplish all of the normal duties of VFR flying — from takeoffs, to cross-country flying, to landings — and handle the complexities of bad weather. VFR flying is accomplished primarily by looking out the cockpit windscreen and utilizing both the horizon and prominent landmarks to keep the sky up and the pilot oriented geographically. Take away the horizon and the prominent landmarks, and the challenge increases by 400%.

Good Instrument Flying requires a superior instrument cross-check, situation awareness, navigation planning, and the ability to quickly absorb, analyze, and react to the information received in the instrument cross-check. Additionally, instrument procedures including VOR navigation, ILS techniques, high and low altitude instrument approaches, must be understood and practiced for the pilot to survive the challenge of instrument flying.

2. INSTRUMENT CROSSCHECK

The instrument crosscheck is the way the pilot scans the information available on his instruments so he can make the continual small changes to aircraft attitude, power setting, and navigational direction required for safe instrument flight. The crosscheck is used for one scan, small changes are made, and the scan is begun again. No one instrument can consume an inordinate amount of time in the crosscheck, and the pilot should be continuously scanning. An excellent instrument pilot will scan his indicators 20-30 times a minute.

The instrument crosscheck on your SOLO FLIGHT aircraft should focus on the attitude indicator in the center of your panel. This instrument tells the pilot when he is banked (and which direction) and indicates the pitch of the aircraft. Keeping the wings level enables that pilot to fly a navigational

heading or an instrument approach. Banking adds heading problems, and requires both additional nose up (stick back) and additional power.

From the attitude indicator the pilot should scan both the altimeter and the airspeed indicator for the current performance of the aircraft. The digital heading indicator and the digital climb indicator (similar to a VVI), located directly below the altitude indicator, are then scanned. Deviations noted on the altitude indicator are sized by the magnitude of the climb indication. Small vertical velocity deviations can be eliminated by small corrections in pitch accomplished by returning the scan to the attitude indicator and making a small pitch change through elevator input, (Stick forward or backward).

Heading deviations noted during the crosscheck of the heading indicator are usually the result of bank added inadvertently by the pilot or by turbulence. Note the heading deviation, return to the attitude indicator, establish a bank angle, and monitor the heading indicator until a lead point (usually 2-4 degrees) from the desired heading is reached. Roll out on the desired heading, monitoring the attitude indicator.

Once the pilot can keep the aircraft under control, i.e. flying straight and level, he can begin to scan the navigation instruments located on the right bottom of the instrument panel. Once the indications (radials off of VOR 1 and VOR 2) have been read, return the crosscheck to the attitude indicator as you analyze the VOR information.

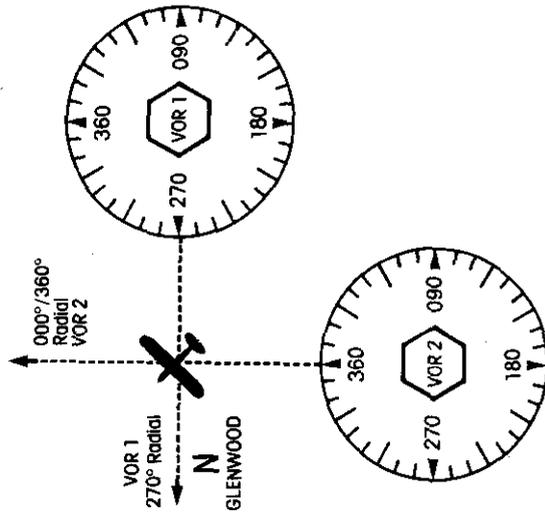
3. VOR NAVIGATION

VOR navigation is based on a series of ground stations that send out radio signals. These signals are received by instruments in the cockpit and decoded and read as bearing to a particular VOR station. There is no range information associated with VOR navigation. Precise positioning is based on either radial triangulation or on radial course guidance, with timing from a known VOR station. The entire United States, and most foreign countries have very complete VOR systems where any point can be defined as an intersection point between multiple VOR stations. In SOLO FLIGHT, each airport is defined as a radial intersection. (A radial bearing is a number from 0 to 360 that if the aircraft was turned and flown on a heading 180 degrees from the radial bearing, the flight path would be inbound to the VOR station.)

North of the VOR station is radial 360, East is 090, South is 180, and West is 270. To find a particular airport in SOLO FLIGHT, the pilot should determine its radial intersection from both VORs. He should then intercept a radial outbound from one of the VORs and fly until the cross radial from the other radial is reached. For example, in the Kansas map, the Kansas City airport is located on the 036 degree radial of VOR 2 with the end of the main runway on the 067 radial of VOR 1. To find the airport in the weather, the instrument pilot could establish himself on the 036 degree radial of VOR 2, heading 036, and descend to missed approach altitude (200-500 feet above field elevation) until crossing the missed approach radial, the 067 of VOR 1.

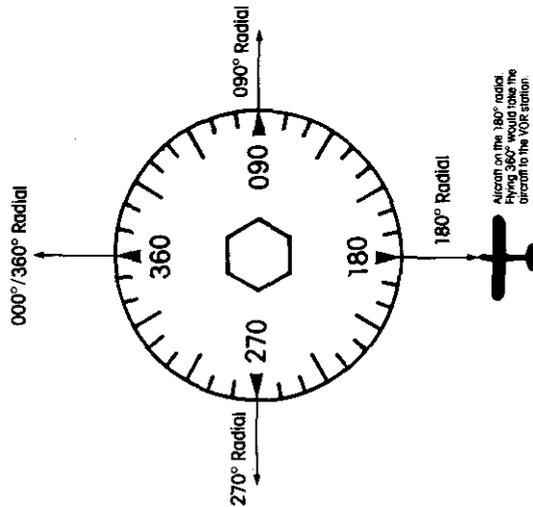
In the more difficult maps, VOR navigation must be used to ensure that the SOLO FLIGHT aircraft does not run into the mountain ranges in the Particular state. After each approach has been flown, the program will plot Your course on the video map. The SOLO FLIGHT pilot can then review his actual flight path with the one he was trying to fly.

VOR POSITIONING



Without DME, two VOR radials are required to establish aircraft position. In this example the aircraft is on the 270° radial of VOR 1 (due west) and the other 000°/360° radial if VOR 2 (due north) heading northwest (315°). That would put the aircraft approximately 5 miles east of Glenwood on the Colorado map. With DME, being on the 270° radial of VOR 1 at approximately 15 DME would identify the same spot on the map.

VOR NAVIGATION



VOR stations send out continuous radio signals that are read by the instruments in the cockpit. The reading in the cockpit is the radial of the VOR on which you are currently located. If you turned the aircraft to a heading exactly 180° from the radial bearing, you would fly directly to the VOR station.

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4. INSTRUMENT APPROACHES

instrument approaches can be high altitude, low altitude, precision, or non-precision.

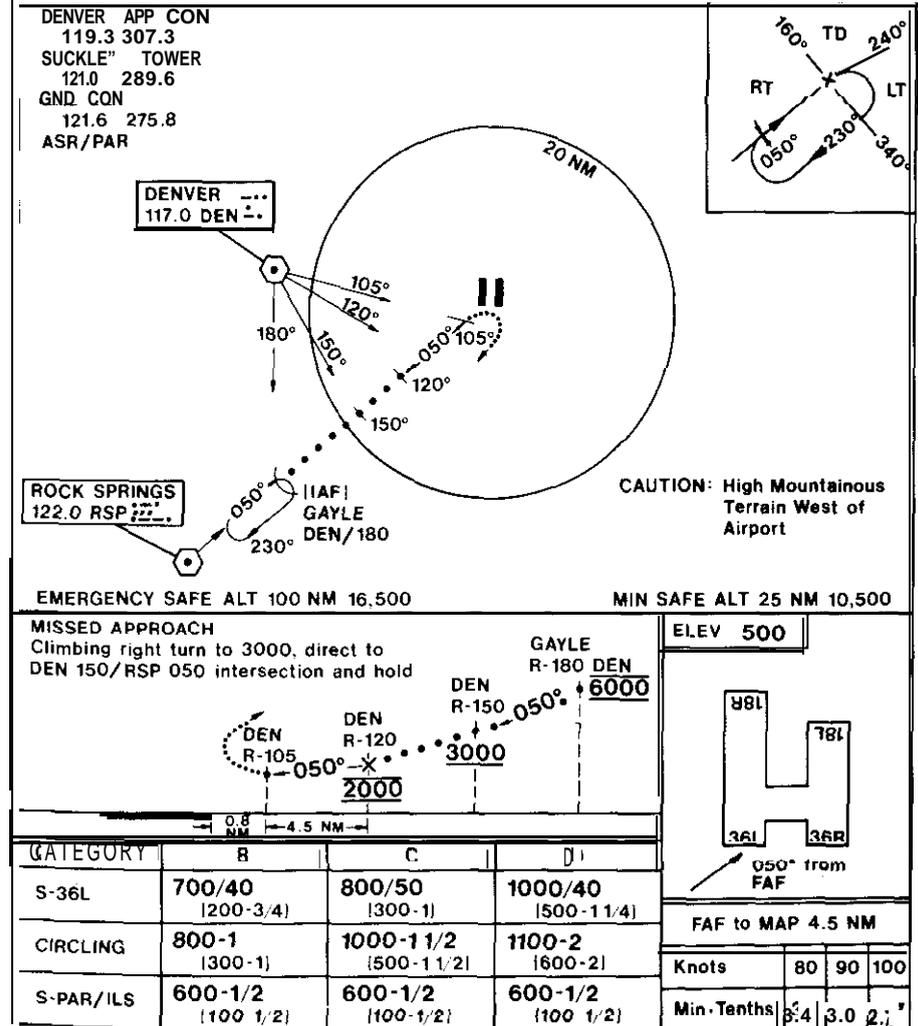
A. HIGH ALTITUDE APPROACHES

High Altitude Approaches consist of a high altitude holding fix, an Initial Approach Fix (IAF), and a prescribed route for the aircraft to fly to avoid either physical obstructions (i.e., in mountains around Denver) or to avoid heavily traveled approach routes (New York City's Kennedy or Chicago's

HIGH ALTITUDE APPROACH

HI-VOR RWY 36L

BUCKLEY ANGB
AURORA, COLORADO



HI-VOR RWY 36L

39°43'N-104°45'W

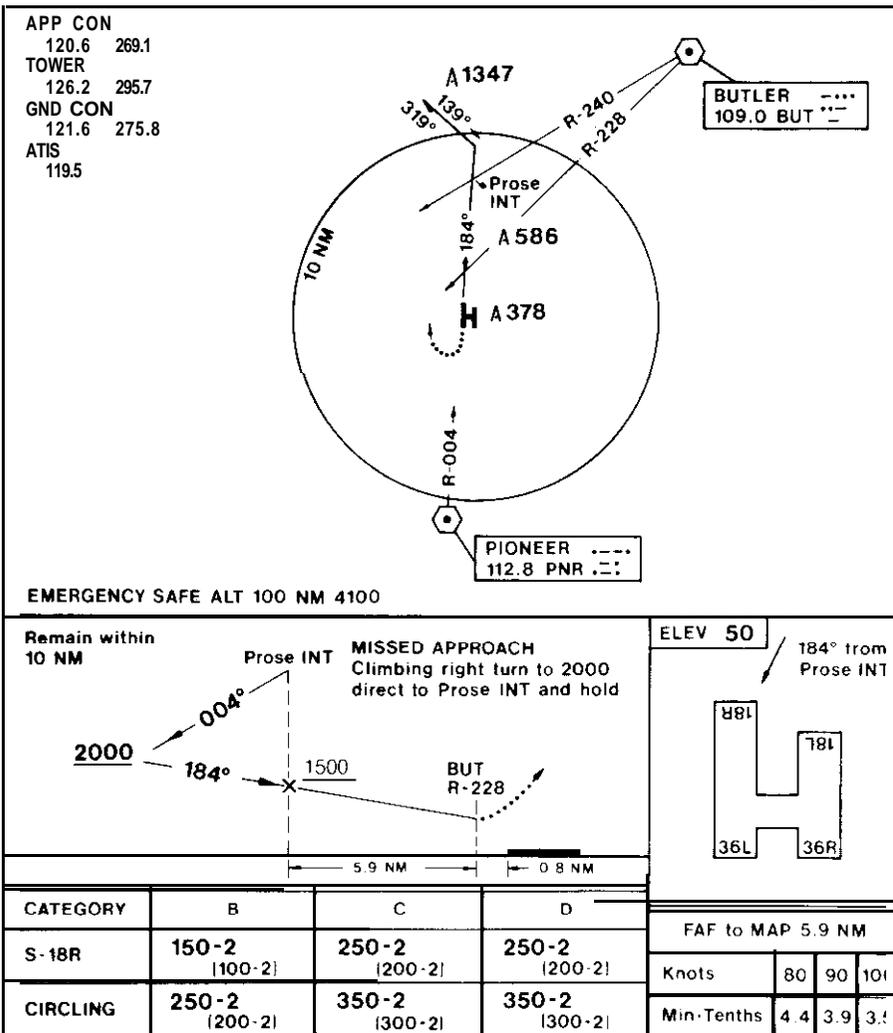
AURORA, COLORADO
BUCKLEY ANGB

O'Hare). The aircraft will penetrate (when cleared by approach control) by reducing power, descending at constant airspeed, and turning to intercept a radial inbound to a Final Approach Fix (FAF). The pattern often resembles a large teardrop that uses the VOR as the pointed end of the teardrop. The final approach fix is a geographic position aligned with the approach runway usually 5 to 10 miles from the airport. The aircraft should be configured for landing and headed inbound on a heading approximately that of the landing runway. The route from the FAF to the runway is usually a straight in. The pilot should descend to arrive at the Minimum Descent

LOW ALTITUDE APPROACH

VOR RWY 18R

WICHITA, KANSAS



VOR RWY 18R

47° 03' N - 109° 28' W

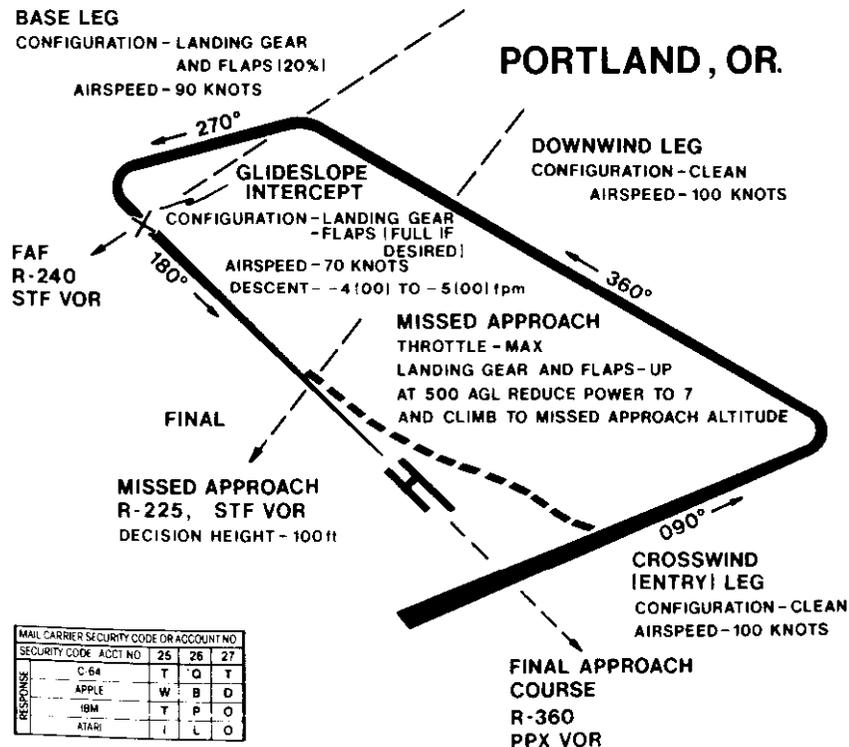
WICHITA, KANSAS

Altitude (MDA, 200-500 feet above field elevation) 30-45 seconds prior to MAP (Missed Approach Point). In SOLO FLIGHT the MAP is defined by a crossing radial from the VOR not providing final approach guidance. (The MAP can also be defined by using timing from the VOR to the approach end of the runway at constant airspeed.) If the runway is in sight at or prior to the MAP and the aircraft is conveniently aligned with the runway, the pilot can land. If these conditions are not met, the pilot should advance power, go around, and try the approach again, or go to a different airport. (Your SOLO FLIGHT aircraft is a simulated 1930 vintage monoplane with a service ceiling of approximately 9000 feet. The SOLO FLIGHT aircraft can fly practice high altitude approaches from as high as 9000 feet.)

B. LOW ALTITUDE APPROACHES

Low Altitude Approaches are quite similar to high altitude approaches. They are defined with an initial holding fix, a prescribed route from the holding fix to the final approach fix that includes a descent and a turn to approximately the inbound heading to the runway, a Final Approach Fix, and a missed approach point. The difference between a high altitude approach and a low altitude approach is that a low altitude approach is usually accomplished much closer to the airport and at lower airspeeds. The objective of both of these non-precision approaches is to get the aircraft aligned with the runway to make a safe landing if the aircraft can break out of the weather prior to reaching the MAP.

BOX ILS PATTERN



ILS (Instrument Landing System)

C-64, IBM and ATARI

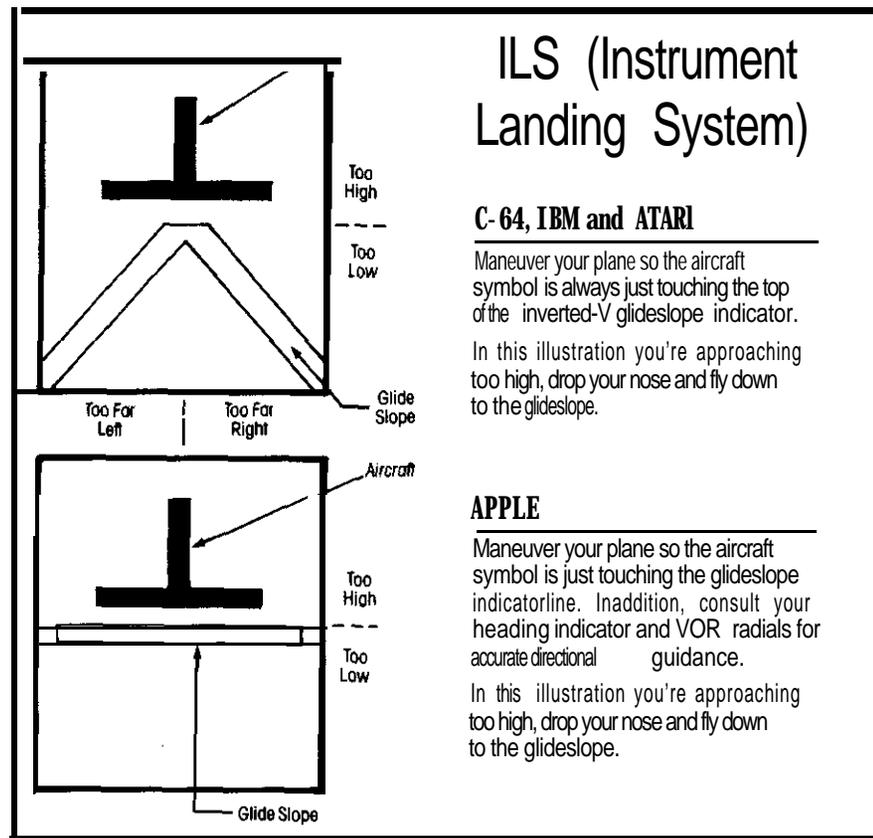
Maneuver your plane so the aircraft symbol is always just touching the top of the inverted-V glideslope indicator.

In this illustration you're approaching too high, drop your nose and fly down to the glideslope.

APPLE

Maneuver your plane so the aircraft symbol is just touching the glideslope indicator line. In addition, consult your heading indicator and VOR radials for accurate directional guidance.

In this illustration you're approaching too high, drop your nose and fly down to the glideslope.



C. LOW ALTITUDE RADAR/BOX PATTERNS

Both the high and low altitude approaches previously described are penetrations that are used when the aircraft arrives at the destination airport at an altitude above normal final approach altitude. The pilot may also be asked to fly a standard "BOX" pattern for positioning to a VOR final, an ILS final, or a Ground Controlled Approach (GCA). A box pattern is a rectangular approach with one long side of the rectangle defined by the landing runway. A 90 degree turn either left or right after takeoff is "crosswind": Crosswind is used to provide spacing between multiple aircraft. Turning 90 degrees again (to be 180 degrees from runway heading) puts the aircraft on downwind. A 90 degree turn back toward final approach puts the aircraft on base leg. (The aircraft should be configured with gear and flaps by base leg and flown at 10-15 knots above final approach airspeed.) Turning from base leg to final approach can be accomplished by one 90 degree turn to runway heading or by two 45 degree turns. Using two 45 degree turns is called DOGLEG to final. The objective of the box pattern is to position the aircraft on final approach, headed inbound, with enough time to descend to the MDA prior to the MAP! Use the SOLO FLIGHT PRACTICE/IFR option to practice box patterns using one VOR for final approach guidance and the second VOR to define a cross radial as the MAP. Your video map will plot your actual course once you have landed at your destination.

5. DESIGN YOUR OWN INSTRUMENT APPROACH

New pilots learn to solo, learn to go cross-country, and then take on the challenge of becoming an instrument pilot. Three instrument approaches are illustrated in your SOLO FLIGHT manual. A high altitude approach to Denver, CO, a low altitude approach to Wichita, KS, and an ILS box pattern to Portland OR. However, SOLO FLIGHT gives you the opportunity to build any number of different approaches to any of the 21 airports in the Mail Pilot game!! Once you have constructed your own approach, you can fly it and see the results both from your success in making a landing at the destination airport and in the route displayed on your video map after landing.

To design your own approach, you will need the following elements:

1. Final approach guidance from/to a VOR on a specified radial.
2. Missed Approach Point (MAP) or Decision Height (ILS) defined by a cross radial or timing from a VOR station. (Altitude for DH.)
3. Final Approach Fix (FAF) defined as a cross radial or a VOR station.
4. Initial Approach Fix (IAF) (usually higher and not collocated with the FAF).
5. Route/Descent from the IAF to the FAF.
6. Altitude restrictions on the approach.
7. Holding pattern and holding instructions, if desired.

(If you use plastic to cover your SOLO FLIGHT maps and approach plates, you can use a favorite pilot tool, the grease pencil, to design your own approaches.)

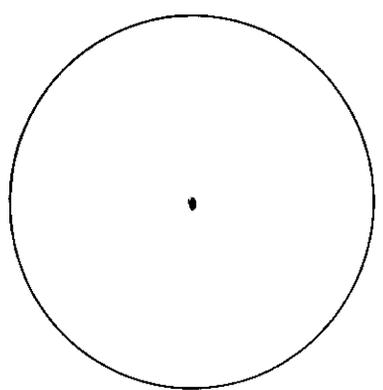
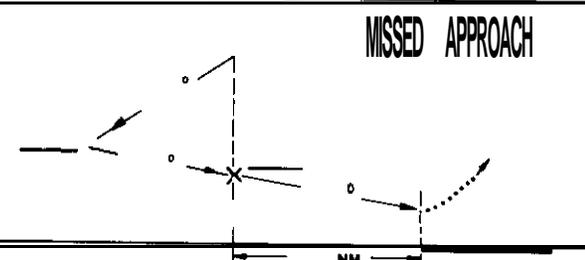
The approach design must take into account the proximity of the VOR's, terrain clearance needed, and the runway heading. Your local library should be able to provide you with further information on instrument flying skills. Use the examples in the SOLO FLIGHT manual to design your own approach on the blank approach plate provided in the manual. Good flying and safe landings to you!!!

C. PRECISION APPROACHES

The high and low altitude and box pattern VOR approaches are defined as non-precision approaches because no direct glideslope information (altitude versus distance to runway) is available to the pilot. Precision approaches can be flown in SOLO FLIGHT by combining VOR final approach and MAP positioning with Instrument Landing System (ILS) glideslope information. The ILS indicator is located on the right side of the instrument panel, just above the VOR indicators. The horizontal line on the instrument panel represents the correct final approach altitude. The aircraft symbol position indicates the aircraft altitude relative to the proper glideslope. (The glideslope is normally a 3-5 degree descent from the final approach fix to Decision Height. DH is the same as MDA but defined as minimum altitude allowed on the glideslope.) If the aircraft symbol is above the horizontal line, the aircraft is above glideslope. Reduce power slightly and lower the nose to increase the descent rate by 2(00) to 3(00) feet per minute. As the aircraft symbol centers on glideslope, increase power slightly and raise the nose to reestablish the correct -4(00) to -5(00) FPM descent rate. If the aircraft symbol is below the horizontal line, the aircraft is below glideslope. The pilot must reduce his descent rate or climb slightly to reestablish the proper glideslope. Once the aircraft is maintaining the proper glideslope

DESIGN-YOUR-OWN-APPROACH

VOR/ ILS RWY _____

APP CON			
TOWER			
GND CON			
			
EMERGENCY SAFE ALT 100 NM			
			
CATEGORY	B	C	D
IRCLING			
		FAF to MAP NM	
		Knots 80 90 100	
		Min-Tenths	

VOR/ ILS RWY _____

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APPLE	J	D	M
IBM	E	P	Z
ATARI	R	U	X

and radial heading, fly down the glideslope until DH or the runway is sighted, whichever occurs first. (If MDA position or DH altitude is reached without the runway in sight with the aircraft in position for a safe landing, advance power and execute a missed approach. Try another approach or go to another airport!!)

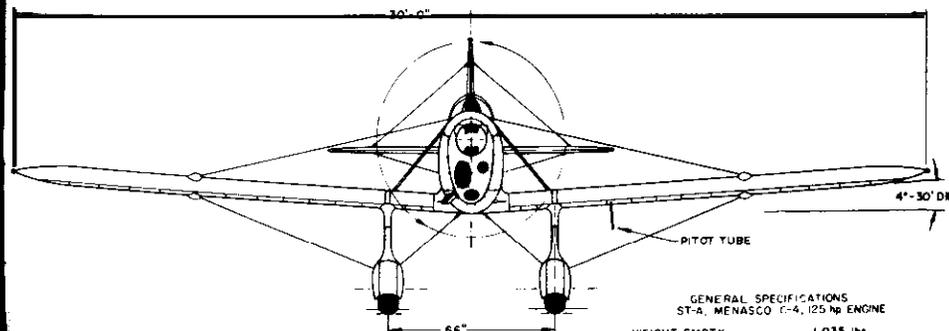
D. ILS

ILS is the most accurate automated landing system currently available to pilots in bad weather. Some modern airliners can land in near 0/0 conditions. (0 visibility and 0 ceiling). Your SOLO FLIGHT weather minimums are 250 feet ceiling and 1/4 mile visibility. Practice your ILS approaches first in VFR conditions using the FLYING/CLEAR option. Practice IFR using the FLYING/IFR option. With sufficient practice, you will feel confident in your ability to survive when real instrument conditions occur!!

Remember, a good instrument pilot makes only one approach to his landing runway. The adrenalin factor goes up considerably if the pilot has made a number of non-successful approaches, his fuel is getting low, and the nearest alternate is 250 miles away with worse weather!!! The best thing the pilot can do is to do the first approach right — on airspeed, on altitude, and ready to land if he sees the landing runway somewhere around the MAP!!

On ATARI, IBM, and Apple versions, your ILS indicator gives glideslope information only. When the small aircraft symbol is above the fixed line in the center of the ILS display, your aircraft is above glideslope. You should lower the nose slightly to increase your descent rate to return to the glideslope. Just the opposite is true when you are below glideslope (symbol below the line.) Combine this information with the VOR radial guidance (fly up/down the required radial) to make a full ILS approach.

On C-54 versions, your ILS also has localizer, left/right indicators. Use the indication exactly as described above. Fly the aircraft symbol back to the center of the ILS indicator for proper ILS descent. An ILS landing should direct you to a perfect landing 500-1500 feet down the runway.



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APPLE	B	G	
IBM	M	F	
ATARI	B	E	

POWER - MENASCO C-4 FOUR CYLINDER
INVERTED INLINE AIRCOOLED
ENGINE RATED 125 H.P. AT 2,175 RPM

GENERAL SPECIFICATIONS
ST-A, MENASCO C-4, 125 hp ENGINE

WEIGHT EMPTY	1,035 lbs
USEFUL LOAD	565 lbs
GROSS WEIGHT (MAX)	1,600 lbs
MAXIMUM SPEED AT S.L.	150 mph
CRUISING SPEED AT 2,000 FT	127 mph
RANGE AT CRUISE	387 miles
CLIMB AT S.L. (MAX EFFORT)	1,200 ft/min
SERVICE CEILING	17,500 feet
LANDING SPEED, WITH FLAPS	60 mph
LANDING SPEED, FLAPS UP	70 mph
TAKEOFF RUN, FULL LOAD	175 yards
WING AREA	124 sq ft
POWER LOADING	12.8 hp/sq ft
WING LOADING	12.9 lbs/sq ft

CREDITS

SOFTWARE AND PROJECT IMPLEMENTATION

Sid Meier

PRODUCT CONCEPT & ORIGINAL ATARI PRODUCT

Sid Meier

PRODUCT CONVERSIONS

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C-64 Version 2- John Kutcher

Apple Version-Andy Hollis

IBM Version-Randall Masteller

Atari Version- Edward N.Hill, Jr.

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Dave Martin

DOCUMENTATION

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