Syracuse Thunderbirds Aero Radio Society

Flight Training Program (FTP)

Charter 473

RC Flight Training www.cnystars.com www.facebook.com/cnystars Issue 2026

Radio Control Flight Training Manual

Syracuse Thunderbirds Aero Radio Society

After incorporating in 1979, and obtaining a use permit from the Town of Schroeppel, the Syracuse Thunderbirds Aero Radio Society model airplane club purchased twenty three acres of farmland four miles east of Phoenix, New York, for the specific purpose of promoting the design, construction and organized flying of radio controlled aircraft.

Today, nearly 100 members enjoy flying off well maintained grass and Geotextile runways, a hovering test area, as well as a control line circle complete with rubberized takeoff runway and concrete pilot pad. The Club membership is comprised of modelers with varying degrees of experience and interests. Some have many decades of experience in the hobby, some are just starting out in the fun world of model aviation. On any particular weekend, you may find a combination of "Sunday Sport" type planes, helicopters, sailplanes, gliders, pattern birds, pylon racers, and WWI or WWII scale aircraft at the field (powered by gas, nitro or electric). Occasionally, a flying witch or flying saucer may also be found cruising around the skies!!

In October 2003, the Club purchased 19.1 acres of farmland from a neighboring estate to the east of the existing property. The STARS now have over 42 acres of land dedicated to RC modeling!!

Visitors are always welcome when the field is open.

If you are interested in learning how to fly R/C airplanes or just have questions about the Club in general, please contact any of the following members:

PRESIDENT: **Mike Mueller (804-873-8928)**
president@cnystars.com

VICE-PRESIDENT: **Tom Polovick (315-436-2790)**
vicepresident@cnystars.com

SECRETARY: **Jeff Wolsley (315-458-0613)**
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TREASURER: **Paul Volcko (315-708-2009)**
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Safety Officer: **Darrel Eckhard (315-297-7868)**
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S.T.A.R.S.

2026

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Flight Training Program Levels

The STARS Flight Training Program (FTP) will consist of two levels of flight instruction.

Standard FTP: The check-off list and training lessons shown within this document were developed for a typical high winged trainer aircraft capable of normal flight, standard taxing, ground take-off and landing. This training program will provide a new student with all that he will need to become successful in the flying, landing and taking-off a traditional three or four channel aircraft.

Park Pilot FTP: The check-off list and training lessons shown within this document will be modified to accommodate Park Pilot size aircraft that are not or may not be capable of normal flight, standard taxing, ground take-off and/or landing. This training program will provide a new student with all that he will need to become proficient with *flying/controlling* a Park Pilot size or prepackaged aircraft. Due to the limitations of the Park Pilot student's aircraft, taxing, taking-off and landing may not be included in his/her training.

Refer to the Addendum section for a description of a Park Flyer aircraft.

Common Questions
About
Flying R/C Model Airplanes

How much does a model cost? **Like any hobby, radio control modeling has initial startup costs that have to borne in order to participate.** ***The new student's budget for either an electric or nitro powered trainer type aircraft, engine, radio equipment, construction materials, and very basic field equipment should be approximately $250.00 to $450.00.***

How fast does a model fly? **Speeds obtained by ducted fan scale jet type model airplanes have been clocked by radar in excess of 225 mph!! However, these are specially designed and maintained by very experienced modelers and are NOT the type of aircraft used for new students.** ***A typical, flat bottom airfoiled, high wing trainer cruises at approximately 60 mph and lands at approximately 25 mph.***

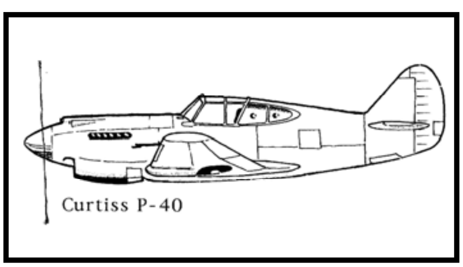
How high does a model fly? **The Academy of Aeronautics has recognized a model airplane altitude record that is in excess of 12,000 feet!! Normally, an average sized model airplane becomes difficult to orient at distances greater than 1000 feet. Consequently, new students are required to fly high enough to permit students to recover from mistakes without crashing and not so high as to lose aircraft orientation.** ***Weather and lighting conditions will effect the students cruising elevation, but normally, a new student will fly between 100 and 200 feet above the ground.***

How far does a model fly? **Current radio control systems have a slant range in excess of one mile. At that range the aircraft would appear as a dot and the pilot would have lost all orientation of the model.** ***Normally, a typical sized trainer aircraft would rarely be permitted to fly beyond a 1000 feet.***

How long can a model fly? **Most methanol burning model airplane engines used in radio control model airplanes are capable of throttle control. This means that the pilot is capable of controlling his airspeed. As with any internal combustion engine, at higher power settings, more fuel will be consumed. Approximately one ounce of fuel will be burned for every minute the engine is running wide open.** ***Since most trainers use an eight or ten ounce tank, a typical training flight will last approximately ten minutes.*** **Flights may be longer since a model's cruising speed while under instruction will be at less than full throttle. Electric powered trainers are now available as an alternative to methanol (nitro) power. The time in the air will again be determined by the power capacity of the motor battery and how the throttle is used during the flight. Typical flight times are five to eight minutes on a battery for a trainer.**

How old should I be to learn to fly? **Although some new students have learned to fly as young as 5, we would suggest that a new student be in their teens before being given a model to fly unsupervised.** ***However, this is a great family hobby and with parental supervision, almost any youngster who has developed the necessary eye/hand coordination can be taught to fly model aircraft.***

Is there a license required to fly? ***In order to participate in the S.T.A.R.S. flight training program, all students MUST hold a current membership the Academy of Model Aeronautics.*** **Membership applications can be found in *Model Aviation* magazine on online at https://www.modelaircraft.org.**



DiGesare 1999

The Radio Controlled Model Airplane

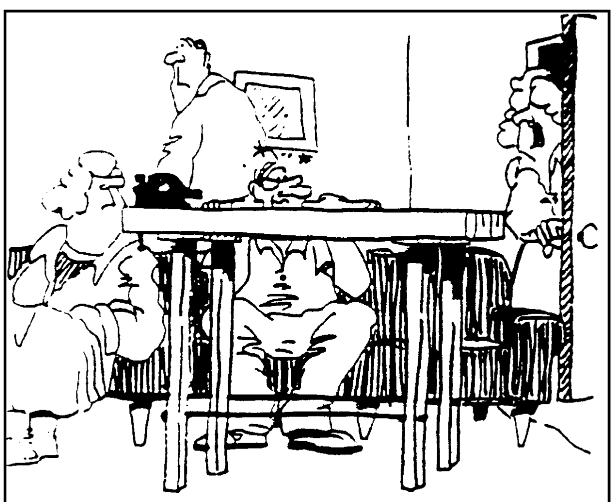
The radio controlled (R/C) model airplane must obey the same physical laws of aerodynamics and operate in the exact manner as a full scale aircraft. The only difference between a R/C aircraft and its full blown counterpart is that you, the pilot, and your instructor stay on the ground.

The radio control system consists of a transmitter which stays with the pilot on the ground and an airborne system which rides along with the aircraft. A typical multi-channel transmitter consists of two to nine channels and is equipped with various control sticks, switches, knobs and levers. A corresponding airborne radio usually consists of a two to nine channel receiver, servos, batteries and an associated wiring/charging harness. Both transmitter and receiver are normally powered by rechargeable batteries.

The pilot of a R/C aircraft flies the model by moving the sticks on the transmitter similar to the joysticks used with home and arcade video games. The transmitter determines which direction and how far each control stick moves and relays this information to the receiver aboard the airplane. The receiver, in turn, detects the signal transmitted, interprets it, and then sends an amplified signal to the servos. A servo contains an electric motor and amplifier that causes the rudder, elevator, throttle or ailerons to move. When a servo receives a signal from the receiver, it pushes or pulls the applicable control surface to the desired position.

Typically, a R/C plane is powered by an internal combustion engine that is measured in terms of volumetric displacement. While a car may have a 3.0 *liter* engine, a radio controlled model may use an engine that has only four tenths (.40) of a cubic *inch* displacement. Yet, when this .40 size engine is run with a fuel consisting of methanol alcohol, nitromethane, and a lubricant, it may develop a power output in excess of one horsepower. Model engines commonly range from .020 to 4.2 cubic inches displacement!!

In the past, the most popular for model aviation involved the use of glow-fueled engines. To a lesser degree, but just as important, are gasoline-fueled engines as employed in the larger models (quarter scale and the like). The third power category is electric, and this has become increasingly popular in recent years because of the many technological improvements in motors and batteries. Most new pilots are using electric power since many of the available trainer type aircraft come pre-built and powered by electric motors.



"The doctor will now see the gentleman who glued his hands to his workbench".

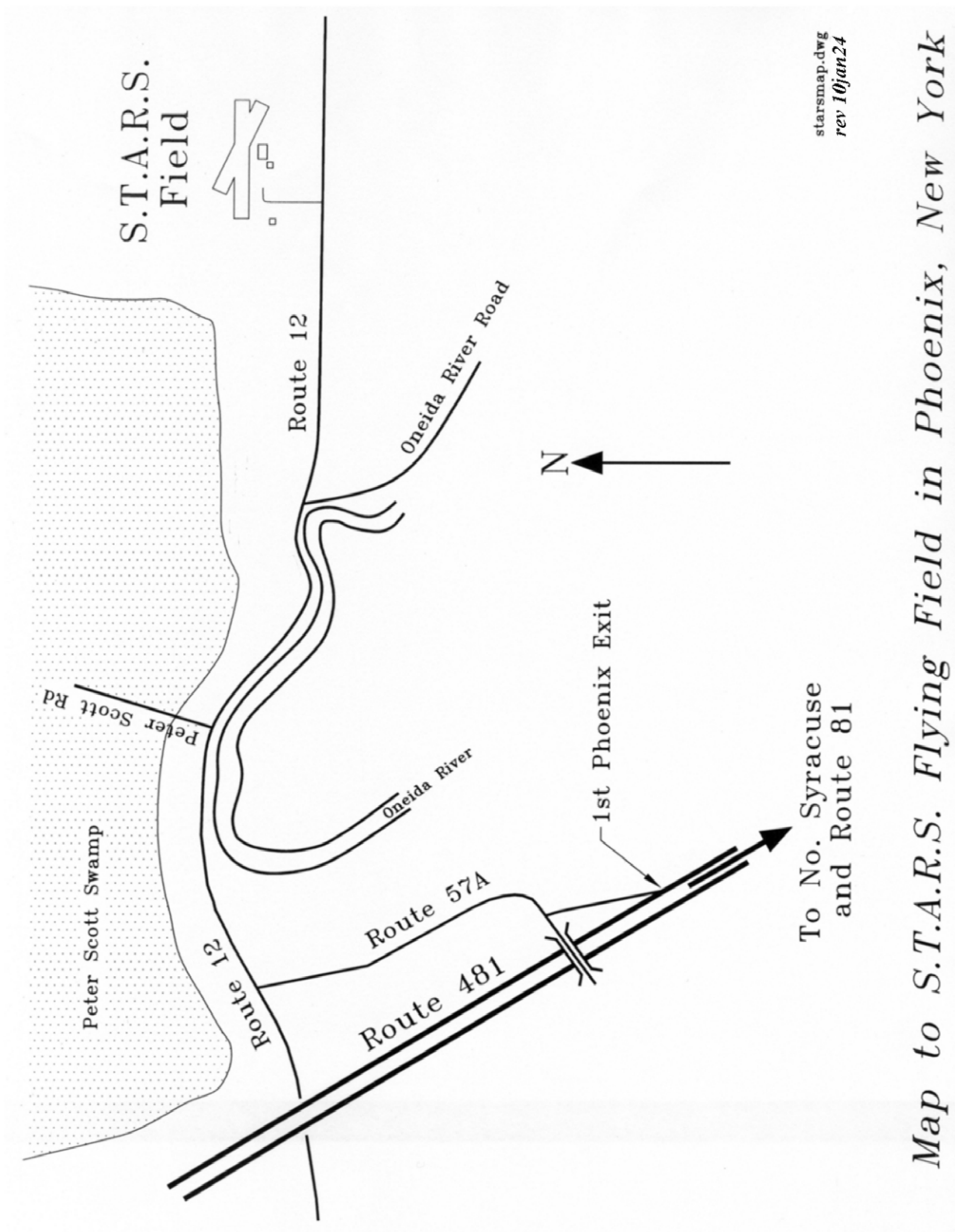
Flying The Radio Controlled Model Airplane

To fly a radio controlled model aircraft, you must develop, to a high degree, eye/hand coordination and learn various conditioned reflex skills. Eye/hand coordination is needed to fly the aircraft because you, the R/C pilot, are not actually sitting in the airplane. You must be able to see what the plane is doing and react by having your hands give the correct control to the transmitter, which, in turn, will relay your command to the receiver aboard the airplane. This is where your conditioned reflexes come into play! This coordination between plane and pilot is a learned skill. To become proficient in flying R/C aircraft requires supervised training sessions at the flying field. Once you have mastered the basics, flying a R/C aircraft will become as natural as riding a bicycle...

The main problem that new students need to overcome is the phenomena of turn control reversal. Have you ever tried to write a sentence so you can read it correctly while looking at the paper through a mirror? In flying R/C, a similar situation occurs when the model is flying towards the student. When the aircraft is flying away from the student, normally there is not a problem--left on the airplane is left on the sticks and right on the airplane is right on the sticks. However, when the aircraft is flying towards the student, the directions are *reversed*. Imagine yourself in the aircraft! From inside the model airplane, left is always left and right is always right! From the ground, the student's eyes are telling him something else and this can become very confusing. *This is why most new students need a qualified, experienced, instructor.* Disorientation is always a possibility. Even full scale pilots fall victim to this turn control reversal problem and find they need as much instruction as new students in flying radio controlled aircraft....

Florio .40 on a touch-and-go.

Ultimate Chaos .40 in knife edge flight.


S.T.A.R.S.
Field
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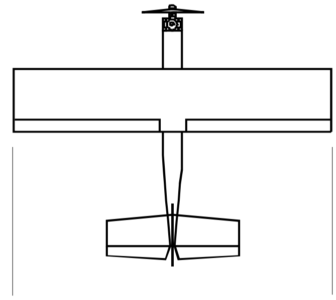
Route 12
Oneida River Road
N
Peter Scott Rd
Oneida River
1st Phoenix Exit
Peter Scott Swamp
Route 57A
Route 12
To No. Syracuse
and Route 81
Route 481
Map to S.T.A.R.S. Flying Field in Phoenix, New York

S.T.A.R.S. Field Rules



1. General:

A. License: All pilots, students, and flying guests *must* have a current membership in a nationally recognized model aircraft association in order to fly. Those pilots participating in the Park Pilot Membership Program must fly models that weigh two pounds or less and be incapable of reaching speeds greater than 60 mph. They must be electric or rubber powered, or of any similar *quiet* means of propulsion.

B. Spectators: Only those people essential to flight operations will be permitted in the pit area; all others will remain on the spectator side of the fence.

C. Vehicles: Vehicles will not be permitted *on* the flying field.

D. Crash Debris: Pilots must retrieve all pieces of their aircraft after a crash. Particularly, attention must be made to obtaining all pieces of aircraft that land in the neighboring fields under cultivation or from the mowed areas that might cause damage to mowing or farming equipment.

E. Trash: All members will take home their own trash.

F. Alcoholic Beverages: Members will not consume alcoholic beverages prior to, nor during, participation in any *modeling* operations.

G. Smoking: Smoking will not be permitted in the pit area or on the flight line.

H. Mowing: Flying on the field will not be permitted if the field is being mowed or maintenanced.

2. Transmitters:

A. Frequency Control: 2.4 GHz transmitter technology is prevalent in the hobby. In general, transmitter impound and channel flagging is no longer necessary. Pilots using a non-2.4 GHz transmitter system or FPV video transmitter should make all efforts to determine if others present are also using one and self-manage frequency separation prior to powering up their transmitter. Event Managers and Contest Directors may establish a transmitter impound or channel frequency control policy for their event, if deemed necessary.

B. Range Checks: Each pilot will conduct a successful radio equipment ground range check, including any FPV equipment, before flying a new or repaired aircraft and prior to each flying session .

3. Engines:

A. All internal combustion engines run at the field will have a silencer (except for small displacements of .09 cubic inches or less).

B. When running an engine in the pits, keep neighboring personnel behind the prop arc. Restrain fuel powered airplanes with stakes, starting stand, or helper prior to starting the engines(s).

C. Electric motors and fuel engines are not to be run in spectator/pavilion areas or anywhere behind pit area fencing or designated test stand/hover areas, unless propellers/blades are removed. Model electronics (receivers, servos, etc.) can be powered up in spectator areas as long as electric motors are disconnected or propellers/blades are removed.

D. Remove or secure all necklaces, straps, loose clothing, hoodie ties, etc. prior to starting a fuel engine powered model. Long hair should be tied back or secured so it cannot get caught in a spinning propeller or rotor.

4. Flying:

A. Boundaries: Flying over the pit area or the spectator side of the fence is prohibited, unless beyond the control of the pilot(s).

4. Flying (continued):

B. Taxing: Taxing is prohibited in the pit area!

C. Flying:

(1). Pilots will initiate their first turn after takeoff away from the pit and spectator areas.

(2). Engines will not be started before 9 AM Monday through Saturday and 11 AM on Sunday (electrics may start at 10 AM), unless approved by the Event Director.

(3). No more than three aircraft will be permitted in the air at one time.

(4). All flying will be conducted from the designated flight boxes.

(5). Hand launching of aircraft is prohibited from the pits.

(6). Flight operations will cease during electrical storms.

5. Guests:

A. All guests must have a current membership in a nationally recognized model aircraft association in order to fly.

B. Guests may fly at the field only with the approval of a member in good standing and only as long as a sponsoring member *remains at the field*. Guests will not fly unattended.

C. A local guest will be allowed to fly at the field on three (3) separate occasions and then will be asked to join the Club.

D. An out-of-town guest may make arrangements with the Club to fly at the field while visiting the area. The Club Officers and the Safety Officer will handle each out-of-town visitor on a case-by-case basis.

E. *All guests are required to extend every courtesy to current members sharing the same flying frequency.* But when there is a conflict over who shall fly, the Club member will have the first option to fly. Both the guest and the members should use common sense while sharing the flight line or using the same radio frequencies.

06jan21

STARS

Field Protocol

Dedicated to responsible RC fun with safety by choice, not chance.

1. General:

A. Civil and courteous behavior is required at the field at all times.

B. Safety is paramount and everyone's business. Use common sense in all matters.

C. It is strongly recommended that you do not fly alone.

D. Learn where the First Aid station is located and inform the Field Committee if material has been issued from it.

E. When opening or closing combination locks, *always* set the wheels to 0000.

F. Last member out must close and lock the refrigerators, pavilion, and main gate.

G. Limit use of cell phones and mobile devices on the flight line to photography/videography or integrated use with a model's systems. Talk, text and browse from the pits or spectator areas.

2. Engine Courtesy:

A. Long term tuning and initial break-in should be conducted away from the pits and spectators (usually at the engine break-in stand).

B. Do not direct prop wash at other modelers, their aircraft, equipment, or bystanders behind the pit fence. Kindly inform those bystanders near the fence that you intend to start an engine before you do so.

3. Flying Courtesy:

A. Any person wishing to enter an active flying field or runway to cross same or to retrieve an aircraft, must loudly announce their intention to all fliers on the flight line.

B. A "landing" aircraft has the right of way over an aircraft "taking-off".

C. A "dead stick" aircraft has the right of way over all others.

D. All take-off and landing attempts must be announced to other pilots on the flight line. Take-offs are normally announced by saying "taking off", and landings are announced by saying "landing" or coming in". Dead stick landings are announced clearly to all pilots in the pits and on the flight line by saying "dead stick".

E. A pilot having difficulty in controlling his/her aircraft must announce to all in the pits and on the flight line that he/she is experiencing radio or mechanical problems. Pilots on the ground preparing to fly will turn off their transmitters and wait for the problem to be resolved before continuing to fly. Fliers in the air will stay clear of the aircraft in distress and will land, if possible, as long as it does not contribute to the crisis. All personnel near the pit area must be alerted to the situation.

F. If a crash occurs on the field or in the pits, all flying will stop until the accident has been investigated and the debris has been cleared from the field.

G. Normal flight duration is 10 minutes. Obviously, flight time may be extended if there are no other pilots waiting to fly or waiting for a particular radio channel.

4. Good Earth Policy:

A. Place recyclables in the appropriate container in the pavilion.

B. Turn off all pavilion lights when departing the field for the night.

C. The field does not have a trash removal service. If you carry anything to the field, carry it back out.

D. If a pilot or guest brings a pet to the field, he/she will be responsible for supervising the animal's conduct while at the field. Please observe all appropriate Field Rules.

E. If you smoke, please place all cigarette butts in the butt cans in the field.

F. Do not dispose of trash in the outhouse/port-a-potty pit.

G. Do not drink the well water. Well water is to be used for washing only.

5. Replacement Courtesy:

A. Where an individual's plane or property is damaged by the actions of another individual, it will be the responsibility of the two parties to resolve the situation in an appropriate manner.

06jan21

PreFlight Checklist

I. Fuselage.

A. Vertical Stabilizer

1. **Is the vertical stabilizer and its rudder perpendicular to both the horizontal stabilizer and the fuselage? Is it attached securely to the fuselage? [ ]**
2. **Is the vertical stabilizer aligned properly with the centerline of the fuselage? [ ]**
3. **Is the vertical stabilizer free from warps? [ ]**
4. **Is the rudder attached properly to the vertical stabilizer with enough hinges? [ ]**
5. **Is the gap between the vertical stab and the rudder as small as possible? [ ]**
6. **Is the rudder horn properly attached to the rudder? [ ]**
7. **Is the pushrod attached properly to the horn? [ ]**
8. **Is the correct clevis used and does it have a keeper and/or a jam nut? [ ]**
9. **Does the rudder pushrod exit the fuselage without bends and is it without play? [ ]**
10. **Is the rudder pushrod/clevis/horn assembly free to move without binding? [ ]**
11. **If there is a tail wheel, is it mounted securely & does it operate without binding? [ ]**

B. Horizontal Stabilizer

1. **Is the horizontal stabilizer and its elevator perpendicular to both the vertical stabilizer and the fuselage? Is it attached securely to the fuselage? [ ]**
2. **Is the horizontal stabilizer aligned properly with the centerline of the fuselage? [ ]**
3. **Is the horizontal stabilizer free from warps? [ ]**
4. **Is the elevator attached properly to the horizontal stabilizer with enough hinges? [ ]**
5. **Is the gap between the horizontal stab and the elevator as small as possible? [ ]**
6. **Is the elevator horn properly attached to the elevator? [ ]**
7. **Is the pushrod attached properly to the horn? [ ]**
8. **Is the correct clevis used and does it have a keeper and/or a jam nut? [ ]**
9. **Does the elevator pushrod exit the fuselage without bends & is it without play? [ ]**
10. **Is the elevator pushrod/clevis/horn assembly free to move without binding? [ ]**

C. Cabin Area

1. **Are the servos properly mounted to the servo tray? [ ]**
2. **Is the servo tray properly mounted to the fuselage? [ ]**
3. **Is each servo arm centered on its respective servo? [ ]**
4. **Is each servo arm secured to its output shaft? [ ]**
5. **Is each pushrod attached to its respective arm with a Z-bend? [ ]**
6. **Are all servos capable of operation without striking neighboring servo arms? [ ]**
7. **Do any servos bind or make buzzing noises? [ ]**
8. **Are the receiver and battery each wrapped in high density foam (if applicable)? [ ]**
9. **Are the receiver and battery properly secured inside the fuselage? [ ]**
10. **Is the antenna run as far as possible from the servos (if applicable)? [ ]**
11. **Does the antenna exit the fuselage via a strain relief and exit guide (if applicable)? [ ]**
12. **Is the antenna the proper length and is it secured properly to the rear of the Fuselage (applicable only to 72 MHz systems)? [ ]**
13. **Is the switch harness mounted on the side opposite the exhaust (if applicable)? [ ]**
14. **Is the switch harness secured properly to the fuselage side? [ ]**
15. **Are all associated wiring properly stowed to prevent pushrods from binding? [ ]**

16. Is the engine servo cable properly adjusted to prevent binding through its whole range of operation? [ ]
17. Are all servos securely plugged into the receiver? [ ]
18. Are all servos plugs installed such that each cable is NOT under tension? [ ]

D. Engine Area (some items are for engines only)

1. Is the fire wall and tank area fuel proofed? [ ]
2. Is the tank mounted at the proper centerline height relative to the engine spraybar? [ ]
3. Is the tank tubed properly? [ ]
4. Is the firewall sealed where the fuel lines pass through the firewall? [ ]
5. Does the supply line have a fuel filter? [ ]
6. Is the pressure line attached to the exhaust muffler nipple? [ ]
7. Are the fuel lines the correct length to allow access to them but not too long to be in the way? [ ]
8. Is the tank vibration isolated? [ ]
9. Is the engine mount securely attached to the firewall? [ ]
10. Is the engine bolted securely to the engine mount? [ ]
11. Is the muffler securely attached to the engine and was a high temperature gasket type RTV sealant used? [ ]
12. Were the head bolts and rear crankcase bolts recently tightened? [ ]
13. Is the engine throttle cable attached to the engine with a ball joint? [ ]
14. Is the correct prop being used for the engine/motor mounted? [ ]
15. Has the prop been balanced? Is the flat side of the prop facing rearwards? [ ]
16. Re-tighten the prop nut. Is the prop oriented correctly at the start of compression?
17. Check the spinner, if used. Has it been balanced? Is it properly installed? [ ]
18. If a steerable nose gear is used, is it securely mounted? Is the control arm free to swing its entire range without binding? Is the pushrod attached to the control arm correctly? Does the pushrod bind between the control arm and the servo? Does the nose wheel turn the aircraft in the same direction as the rudder? [ ]
19. If a steerable nose gear is used, is the nose gear centered when the rudder is centered? [ ]
20. Does the engine/motor have the correct right and/or down thrust? [ ]
21. Has the engine been properly broken-in? Electric motor lubed?? [ ]
22. Has the engine idle been set and is it reliable? [ ]

II. Wing.

A. Is the wing free from warps? [ ]
B. Are the ailerons attached properly to the wing with enough hinges? [ ]
C. Are the gaps between the wing and the ailerons as small as possible? [ ]
D. Are the aileron horns properly attached to the ailerons? [ ]
E. Are the pushrods attached properly to the horns? [ ]
F. Are the correct clevises used and do they have a keeper and/or a jam nut? [ ]
G. Are the aileron pushrods without bends and are they without play? [ ]
H. Is the servo properly mounted to the wing center section or servo tray? [ ]
I. If used, is the servo tray properly mounted to the wing? [ ]
J. Is the servo arm centered on its respective servo? [ ]
K. Is the servo arm secured to its output shaft? [ ]
L. Is each pushrod attached to its respective arm with a Z-bend? [ ]
M. Is the servo capable of operation without binding or buzzing? [ ]
N. Is the servo/linkage set up for the correct differential? [ ]
O. Has the center section been adequately reinforced? [ ]
P. Place the wing on the fuselage and secure it with an adequate number of rubber bands. Is the wing square with the fuselage *and* the tail planes? [ ]

Q. Check the wing for proper incidence. Discuss the concept of incidence with the new student. Show the relative location of the thrust line to the axes of yaw, pitch, and roll. [ ]

III. Balance.

A. Demonstrate how to check for the balance point to make sure it is within the range of the airfoil type used in the aircraft. [ ]
B. Check the balance point of the aircraft. Is it correct? Discuss the purpose of the balance point and its relation to flight stability. [ ]
C. Adjust the balance point, if necessary, before flight. [ ]

IV. Landing Gear.

A. Inspect the landing gear. Are the wheels free to spin and without drag? [ ]
B. Is the landing gear aligned properly to allow the correct tracking? [ ]
C. Are the wheels attached properly to the landing gear? Are the wheel collars tightened? [ ]
D. Do the main wheels have the correct toe-in and camber? [ ]
E. Does the fuselage sit squarely on the landing gear? Straighten, if necessary. [ ]
F. Is the nose gear strut spring face the rear? [ ]
G. Is the nose gear strut the correct length for easy takeoffs and landings? [ ]
H. Are the wheels the correct size for the field conditions? [ ]
I. Is there sufficient prop clearance? [ ]

V. Range Check, Pre-flight Check, and Engine Startup.

A. Range Check

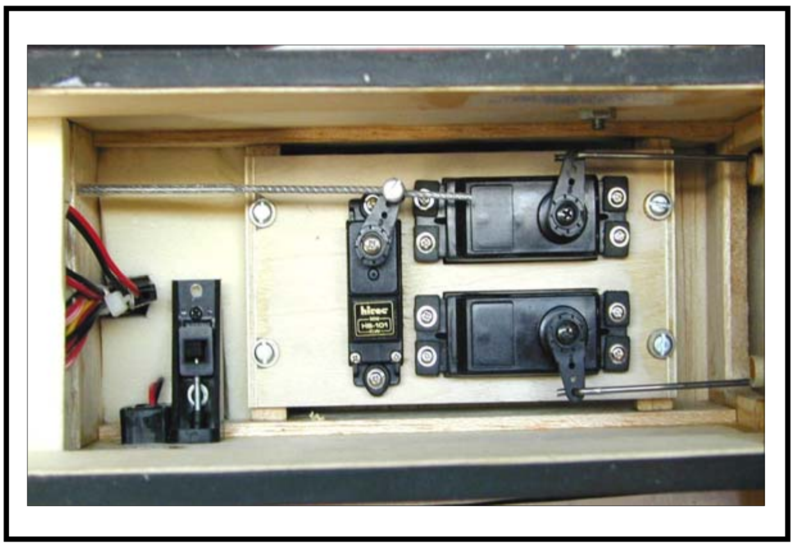
1. Were the batteries charged overnight prior to arriving at the flying field? Explain the importance of proper battery maintenance and service. [ ]
2. WHEN THE FREQUENCY PIN IS AVAILABLE, attach it to the transmitter antenna. (Frequency pins are not required for 2.4 GHz radio systems). [ ]
3. Explain the field use of the frequency board, pilot positions on the field, and the maximum number of aircraft allowed airborne simultaneously. [ ]
4. Conduct a range check of the aircraft radio system. Explain the importance of conducting this check prior to each flying session. [ ]

B. Pre-flight Check

1. Verify that each servo moves smoothly, without hesitation, and IN THE PROPER DIRECTION!!! [ ]
2. Are all trim levers centered? Adjust linkages mechanically to insure that all movable surfaces are centered and that trims are also centered. [ ]
3. Again, after making any adjustments, check that each movable surface is controlled in its proper direction. [ ]
4. Make sure that dual rate switches are on low rate, if used, and then check the amount of surface deflection. Adjust operational rates, if necessary. If dual rates are not used, adjust control horns, as necessary, to prevent too much control surface movement. [ ]
5. Conduct one final check to make sure the aircraft is ready for its first flight. Are there enough rubber bands on the wing to hold it securely to the fuselage (if applicable)? [ ]

C. Engine Startup (for wet engine only)

1. Have the student fill his fuel tank. Did he pump fuel into the correct port of the fuel tank? Is the correct line attached to the muffler pressure fitting? [ ]
2. Make sure that the prop is aligned properly against the compression stroke. Then, if the student is not familiar with starting his engine, demonstrate how to choke the engine, test for ignition by carefully pulling the prop through several revolutions, and then how to start it. [ ]
3. After the engine is warmed-up, tune the engine for first flight conditions. Describe to the student what is meant by an engine being too lean or too rich. [ ]
4. Check the low speed setting by allowing the engine to run a short period of time in idle. Adjust, if necessary. [ ]



Example of a clean setup in a fuselage.

A secure, tight, non-binding horn linkage.

Steps and Lesson Plans

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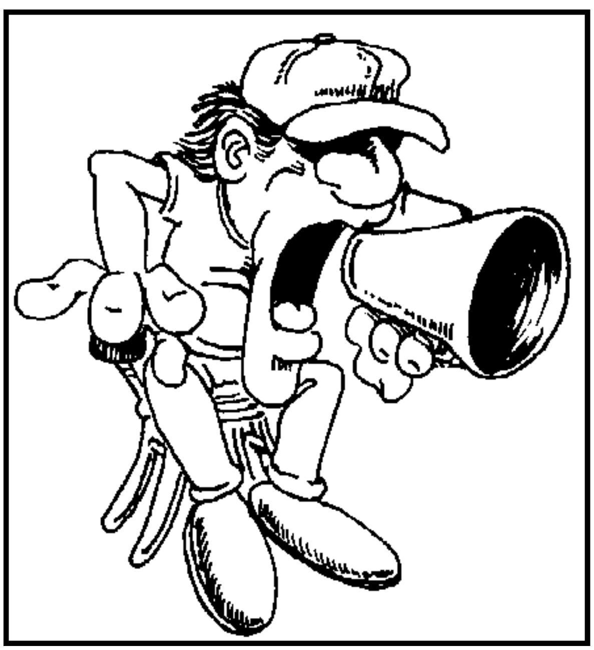


STEP 1

Aircraft Check-in

Upon arriving at the STARS Field with your new aircraft, ask for the Check-in Flight Instructor.

You will be directed to bring your plane and transmitter to the pavilion for the initial preflight inspection. Your Instructor will thoroughly inspect your new aircraft for airworthiness.

Your Instructor will work with you to make the corrections to the aircraft, if necessary, to make it ready to be placed on the Flight Line. If the model cannot be corrected at the field, or corrections are too extensive, the student may be asked to make the necessary changes at home.

When you return the following week, ask for the same Check-in Flight Instructor.

STEP 2

Engine/Motor Setup

After completing STEP 1, ask for the Engine Flight Instructor (if nitro powered).

The Engine Flight Instructor will work with you to run and setup your engine before placing it on the Flight Line. If the engine needs to be broken-in, he will show you how to do so.

After the engine has been run and the idle has been set, take your aircraft to the Flight Line, place your transmitter in the impound, and sign-in with the Flight Line Boss. Students with 2.4 GHz radio systems will not be required to impound their transmitter.

<u>Review and sign the FTP Safety and Field Rules Acknowledgement form and return the form to the Flight Line Boss.</u>

Electric powered aircraft will not receive a break-in run prior to your first flight. However, during the Step 1 procedure, the motor wiring, run direction, idle stick position, shaft adapter and prop balance will be addressed.

Lesson 1

Radio and Field Familiarization

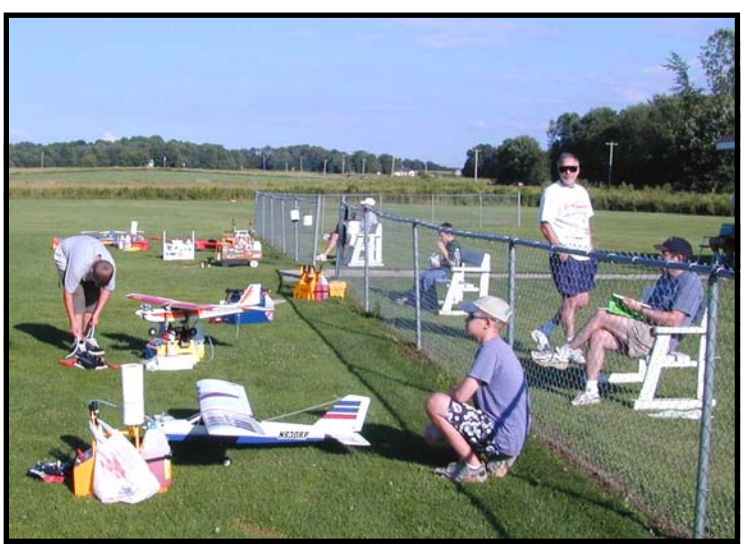
Purpose: To teach the student how to properly use the transmitter at the field.

Objective: To make the student aware of the necessity for frequency control, self-disciplined and considerate use the transmitter, and safe operation of his/her aircraft at the field.

Elements:

1. The need for frequency control.
2. Use of the impound (for non-2.4 GHz transmitters).
3. Improper operation of the transmitter and interference.
4. How to conduct a range check, when, how often, and why.
5. Batteries: a. normal charging, b. checking.
6. Flight line boundaries.
7. Aircraft pit area and spectator areas.
8. Pit area safety and engine/motor operation.
9. Pilot stations and safety barriers.
10. Taxing on the field.
11. Right of way on the field.
12. Restricted air space.
13. Emergency procedures.

Evaluation: Student should meet the requirements of the lesson objectives and understand and practice all of the lesson elements.
A range check must be made before every flight session.



Lesson 2

Aircraft Familiarization

Purpose: To teach the student how to properly preflight his aircraft.

Objectives: The student should be able to inspect his model and identify any deficiencies/problems that could cause a malfunction of the aircraft or present a safety hazard on the flight line.
He should be able to start and adjust his engine (if wet).

Elements:
1. Overall inspection of the aircraft structure.
2. Inspection of all linkages and control surfaces.
3. Check for proper throw, direction, and freedom of movement.
4. Inspection of engine, muffler, and fuel tank.
5. Check prop for damage and tightness of prop nut/spinner.
6. Flight Instructor's demonstration of safe engine starting and engine adjustment (if applicable).
7. Student starts and adjusts the engine (if applicable).
   A. Instructor teaches student how to identify rich and lean engine settings.
   B. Instructor teaches student how to adjust engine for proper idle.

Evaluation: Student should meet the requirements of the lesson objectives and understand and practice all of the lesson elements.
Elements 1 through 5 should be conducted before every flight session.

Lesson 3

Flight Familiarization

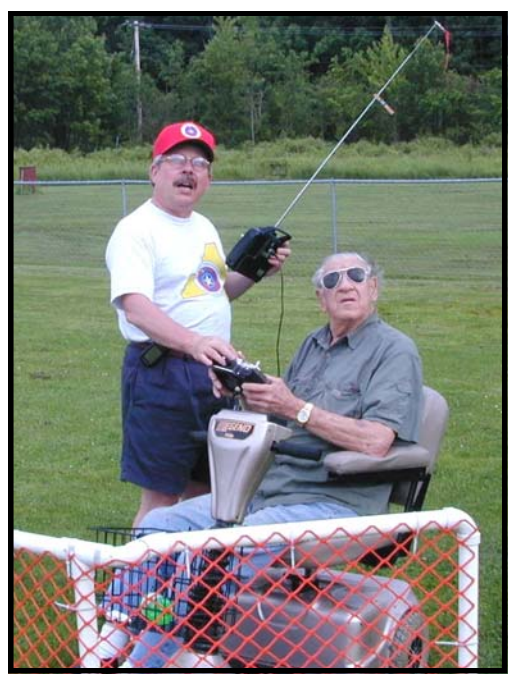
Purpose: **To teach the student how to control the model aircraft in flight.**

Objective: **To allow the student to become familiar with the aircraft's controls, their use in flight, and the aircraft's response to those controls.**

Elements:

1. **Conduct ground training with the student. Familiarize the student with the control sticks and what kind of reactions he/she can expect from the aircraft. Keep it simple!!**
2. **Explain to the student how the Instructor will pass the transmitter to the student for flight training and how the student will return the transmitter when the Instructor asks for it.**
3. **Explain to the student that he will receive his flight instructions on the ground and will review them before he is given the transmitter.**
4. **The Instructor now can fly the airplane and trim it for straight and level flight. If the aircraft's control surfaces need to be adjusted, land the airplane, and involve the student in the corrective adjustment. Repeatedly fly the aircraft until it is trimmed.**
5. **After the aircraft is trimmed, allow the student to fly it.**
6. **After landing, discuss what was learned during the initial flight.**

Evaluation: **The lesson will be completed when the Instructor has determined that the student is able to execute proper control inputs to achieve the desired change in the aircraft's attitude or heading.**
Proficiency and accuracy are <u>not</u> criteria at this point.



Lesson 4

Basic Flight Maneuvers

Purpose: **To acquaint the student with basic flight maneuvers.**

Objectives: **The student should be able to properly control the model during basic maneuvers. The Instructor will discuss and explain disorientation.**

Elements:
1. **Level flight and trim.**
2. **Banked turns.**
3. **Straight climbs.**
4. **Climbing turns.**
5. **Gliding.**

Evaluation: **The lesson will be completed when the student can perform the basic flight maneuvers without assistance from the Instructor. Each maneuver should be accomplished with a reasonable degree of accuracy.**

Lesson 5

Accuracy Maneuvers

Purpose: To teach the student how to perform the five basic maneuvers to a standard that will develop proficiency in their execution.

Objective: To develop the skill and ability of the student to control the model in a specific manner.

Elements:

1. Level flight - maintaining heading and altitude.
2. Level flight at reduced power - maintaining heading, altitude, and trim.
3. Left and right turns - to specific headings as directed by the Instructor.
4. Climbing turns - to specific headings as directed by the Instructor.
5. Low power (idle) glides - that require the student to maneuver the aircraft to a specific area and approximate altitude. Review disorientation with the student, if necessary.

Evaluation: The lesson will be complete when the student can maneuver the model at the Instructor's discretion and can demonstrate an ability to control the aircraft in an accurate manner.
The student should now be aware of aircraft orientation problems and know how to recover the aircraft.

Lesson 6

Orientation Maneuvers

Purpose: To develop the judgment, skill, and ability necessary for the student to make his first landing.

Objectives: The student should be able to control the aircraft regardless of its heading or direction relative to himself.

Elements:

1. **Figure 8**. The student must fly a Figure 8 pattern consisting of two 360 degree turns, one left and one right. The student must place the maneuver centered in front of himself at a distance and altitude designated by the Instructor.
2. **Rectangular Pattern**. The student must fly a rectangular pattern at a safe altitude with the upwind legs in line with the centerline of the runway.

Evaluation: The lesson will be complete when the student can fly the Figure 8 without experiencing disorientation and can fly both right and left hand Rectangular Patterns consistently and accurately.
Proficiency and accuracy are criteria at this point.

Lesson 7

Stalls

Purpose: To develop the student's understanding of stalls, their cause, and avoidance.

Objective: To teach the student to recognize and recover from stalls.

Elements:

1. Conduct ground training with the student. Familiarize the student with the concept of aircraft stalls, what causes them, and how to recover.
2. Practice stalling the aircraft in flight, both with power and without power.
3. Explain to the student that stalls can occur in turns (Take-off, Departure stalls). Note: During this lesson, it should be emphasized to the student that a stall can occur at any airspeed and is a function of angle or attack.

Evaluation: The lesson will be completed when the student understands the cause of stalls and has demonstrated proper recovery from power-on and power-off stalls.
Moreover, the student should have learned how to avoid unintentional stalls.

Lesson 8

Take-off

Purpose: **To teach the student how to make a normal take-off.**

Objectives: **The student should be able to control the aircraft during a normal take-off.**

Elements:
1. Conduct ground training with the student. Discuss the effects of engine torque, P-factor, and slipstream factor during take-off and climb-out, the use of rudder, and the use of throttle.
2. Demonstrate the proper way in which to taxi the aircraft to the take-off point.
3. Demonstrate a proper take-off down the center of the runway.
4. Land and allow student to practice precision taxi to take-off point.
5. Allow student to make a normal take-off into the wind.

Evaluation: **The lesson will be complete when the student can take-off into the wind and establish a normal climb with adequate airspeed. The student must also demonstrate adequate directional control during take-off!!**
Safety during taxiing and take-off *must* be emphasized.

Lesson 9

Landing

Purpose: To teach the student how to make a normal landing.

Objective: To develop the student's ability to visualize and perform a stable, controlled approach to landing. To perform a normal landing.

Reference: Refer to Appendix A for illustrations and further discussion of landings.

Elements:

1. Conduct ground training with the student. Review the Rectangular Pattern. Discuss the need for precision control of the aircraft near the ground with a reduced power condition. Explain the effect of wind.
2. The student will fly a Rectangular Pattern as in previous lessons, but will reduce power and establish a normal glide on the base leg, and continue the approach until over the end of the runway, at which point he will be told to add power and go around.
3. As the student becomes comfortable with the maneuver, the altitude should be lowered until the Instructor is confident that the aircraft can glide to the runway in idle. At that point, the Instructor will tell the student to continue the approach and land.

Evaluation: The lesson will be completed when the student has successfully landed the aircraft several times and is comfortable with the maneuver.

Lesson 10

Emergency Procedures

Purpose: To prepare the student for the unexpected.

Objectives: The student should be acquainted with procedures to use in emergencies, both in the air and on the ground.

Elements:

1. Discuss with the student the reasons for the field rules concerning safety in the pit area.
2. Discuss the procedure to follow when taxing out of the pilots box.
3. Discuss with the student the procedures to use when having trouble attempting to take-off.
4. Discuss with the student the following possible in-flight problems and how to deal with them: engine failure, radio failure, radio interference, structural failure.
5. Allow student to make a dead-stick landing into the wind.

Evaluation: The lesson will be complete when the student can make an simulated loss of power (dead-stick) landing.
Safety during taxiing and take-off *must* be emphasized.

Lesson 11

Solo Flight

Purpose: To build confidence in the student's ability to fly.

Objective: The student is conduct a solo flight in accordance with the STARS Solo Flight Checklist.

Elements:
1. The student will conduct a solo flight using the Solo Flight Checklist.
2. The Instructor monitors the student's performance and assists ONLY when necessary.

Evaluation: The lesson will be completed when the student has demonstrated a practical knowledge of all course objectives, has observed all safety operating rules, is familiar with the Field Rules, and successfully flown his aircraft unassisted.
The student may continue to participate in the FTP after he has solo'd. <u>After he has become very comfortable with routine flying maneuvers, he may contact the Senior Flight Instructor and request additional training in Basic Aerobatics.</u>

S.T.A.R.S.

Flight Training Program

Solo Flight Checklist (for Non-Park Pilot Aircraft)

1. Describe the safety rules currently used at the STARS flying field. [ ]

2. Demonstrate how to correctly preflight your aircraft. [ ]

3. A. Demonstrate how to properly fill a fuel tank and safely start your engine, or [ ]
B. Demonstrate how to properly connect a battery and initialize your ESC. [ ]

4. After getting permission to fly, demonstrate the following to the instructor:

A. Taxi to a safe, take-off point into the wind. [ ]

B. Conduct a straight take off directly down the center of the runway. [ ]

C. After takeoff, turn away from the flight line and demonstrate straight & level flight. [ ]

D. As directed by the Instructor, demonstrate a figure eight maneuver while maintaining level flight. [ ]

E. Conduct one inside loop and one power on stall. [ ]

F. At the discretion of the instructor, set up for a left or right pattern and land. [ ]

G. Take off again and conduct a "dead stick" landing, at the discretion of the Instructor. [ ]

Student's Name ______________________________ **AMA** ________________

Instructor's Name ____________________________ **Date** ________________

Comments ____

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Appendix A. Landing Techniques

The standard pattern approach (Fig. 1) has been finalized during the last 75 years of full-size flying. It is useful in several ways. One is easy traffic separation at busy airports. While good for full-size, traffic separation is rarely critical at RC model fields where the pilots are standing within a few feet of each other. In addition, most RC pilots have truly impressive vocabulary tools they employ when another plane comes too close to theirs!

But the traditional full-size pattern approach has other major advantages for the RC pilot. A normal landing requires the pilot to manage several important aircraft parameters such as speed control, descent rate, attitude (the plane's, not the pilot's), wind correction, approach position and touchdown point. Managing these tasks while the plane is close to the ground and in the short time available before landing is sometimes difficult. The traditional landing pattern separates these piloting tasks into single, discrete operations. This pattern also provides the pilot extra time in which to plan and adjust the approach as it develops. To see how this happens, we'll break each major section of the landing pattern into its component parts. For now, consider there is no wind and the plane is a standard 40-60 size trainer. Take a look at Fig. 1:

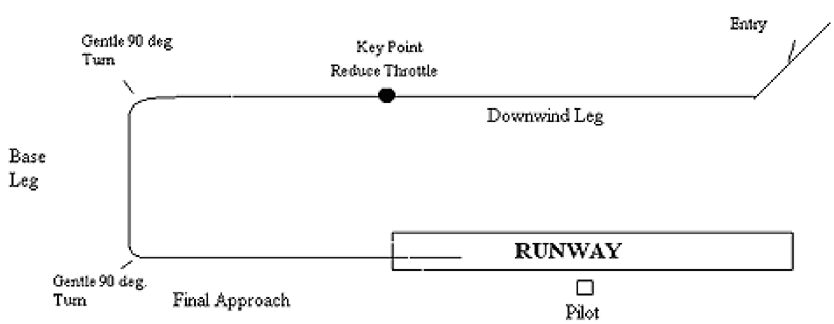

Fig. 1

The first part is the pattern entry into the pattern's first section, or "Downwind Leg". While shown at a 45 deg. angle in the diagram, entry position is not as critical for RC. Entry can be made from almost any safe angle, even from the runway side (a "crosswind entry"). The plane should complete the entry at about an altitude of 200 feet, at half throttle and located 1-200 feet to the pilot's right (or left side if the approach is flown from the opposite end, a "Right Hand" pattern). The pilot flies the first part of the Downwind while maintaining straight, level flight. With no wind, the Downwind leg should be about 200 feet out from the runway.

No other piloting task is required during this section, just straight, level flight. When the plane reaches a point opposite the runway end, the <u>Key Point</u>, the pilot reduces throttle to 2-3 "notches" above idle. The plane's nose will drop some and the plane will begin to descend. The pilot adjusts the descent angle by holding some "up" elevator while the plane is still flying straight. No other task is required at this time except to achieve the proper descent attitude. (Your instructor will help you achieve this attitude the first few times). Again only a single piloting task is required.

The pilot has 150 feet of straight flight to achieve the proper descent attitude. Usually, the fuselage is just slightly pointing downwards in most trainers. If the plane is at the proper attitude, but is descending faster than you would wish, add a notch or two of throttle. Do not raise the nose. Always remember, at any approach airspeed, throttle controls descent rate, elevators control airspeed. Raising the nose will only slow the airplane's speed due to increased drag and then the plane will descend MUCH FASTER. In fact, it may stall and then really descend faster.

Adding throttle provides extra air under the wing's center section and also over the tail. The extra lift slows the descent rate but doesn't really increase airspeed as long as the descent attitude is maintained. This seeming contradiction is harder for RC pilots to comprehend than it is for their full-size counterparts. Full-size pilots have only to feel the increased lift that the throttle provides, and watch their descent meter slow (actually called "rate-of-climb" gauge) while their airspeed indicator remains steady, to understand.

RC pilots just need to try this "up high" a few times at first. Fly past yourself about 200 feet high, at quarter throttle, in a sight descent and apply extra up elevator. Like a car going uphill, the plane gains some altitude but slows dramatically. Then the nose drops and the plane begins a steep descent. Make another pass in a shallow descent and apply a little extra throttle instead of elevator. The nose remains steady but the glide path becomes shallower.

Sorry for the digression, but that concept is important to every RC pilot, especially when flying high performance airplanes. We left the approach with the plane descending slightly and the throttle set 2-3 notches above idle. Next comes a gentle, max. 45 deg. bank, 90-degree turn into the "Base Leg". The same descent rate is maintained in the turn, add a notch of throttle if required. The turn is only 90 degrees; which is the easiest part of any turn since it is in the second 90 degrees of a turn where the plane slows and starts to drop. Actually this turn is over before the pilot realizes it. Again, just one piloting task is needed at any given time. The pilot only has to maintain straight, descending flight all through the Base Leg.

Then the plane is turned toward the runway with another gentle 90-degree turn. The plane is now headed towards the runway in straight descending flight. If the plane's touchdown point appears short of the point opposite the pilot, add throttle. If the landing might be past the pilot, called "long", remove those last 2-3 notches of throttle. Always maintain the descent attitude. If the airspeed appears too fast, add a little up elevator. If the plane is flying too slowly, you'll notice a very steep approach developing so add throttle and then release some up elevator. On the critical final approach, the pilot is only managing the touchdown point. Everything else has already been accomplished.

Once within 2-3 feet of the ground, just raise the nose slightly with up elevator, keeping everything else the same, and the plane will land main gear first in a straight line, right in front of the pilot. We did this approach with a trainer, but the same technique works for every plane from a scale fighter to a high performance Extra 300.

This all sounds great, but what about the wind? The pattern lets the pilot automatically adjust for crosswinds or for winds right down the runway, without any change in landing management. Consider a wind almost down the runway. All the pilot needs to do is to shorten the Downwind Leg after the Key Point! This shortens the Final Approach, reducing the amount of ground the plane has to cover. Since the plane has a slower ground speed on Final Approach, it covers the shorter distance in the same time. Therefore the identical descent rate works for wind or no wind conditions (Fig. 2).

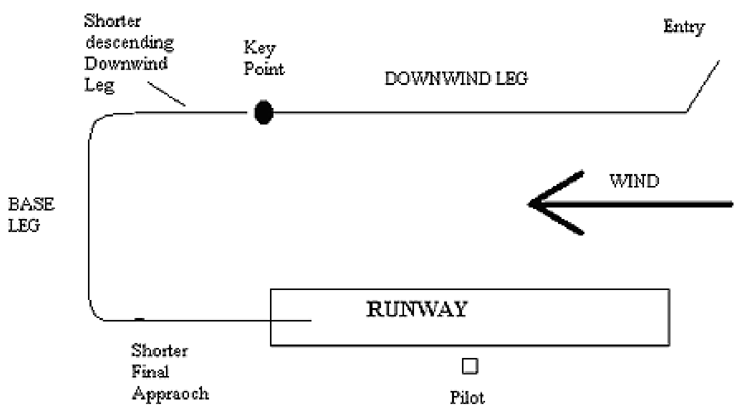

Fig. 2

How about a crosswind? Just move the Downwind Leg closer to, or further away from, the runway. This adjusts the length of the Base Leg. A shorter Base Leg reduces the distance the plane needs to fly if the Base Leg heads into the wind.

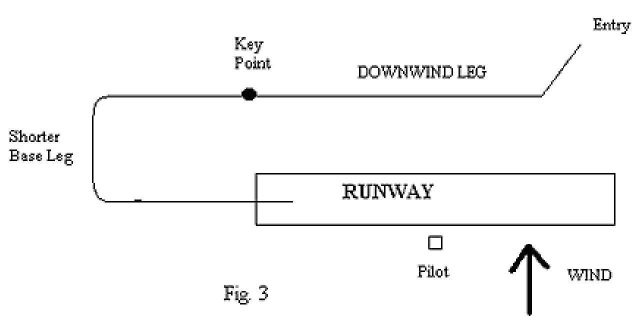

Fig. 3

In Fig. 3, the wind is from behind the pilot. Obviously, the plane's groundspeed during the Base Leg will be reduced. So the Downwind is flown closer to the runway to compensate for the Base Leg's reduced ground speed.

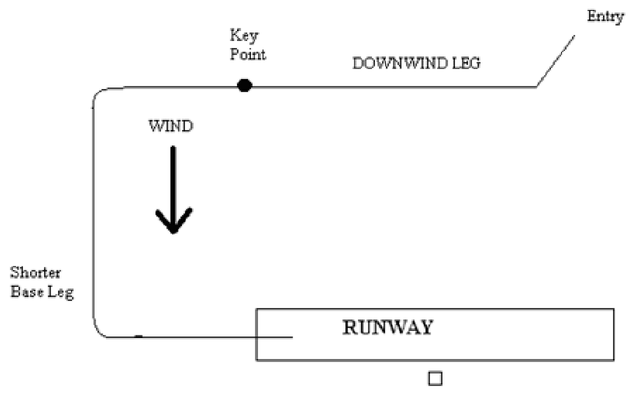

Fig. 4

If the crosswind is towards the runway (Fig. 4), fly the Downwind <u>further away</u>. The longer Base Leg compensates for the higher groundspeed. In cases where there is a 45-degree head/cross wind, move the Downwind and adjust its length as required.

There is one final wind adjustment. In order to compensate for any crosswind component, the plane must be flown headed slightly into the wind, especially on final approach. This has the effect of increasing the ground distance since the plane's movement is not all directed in a straight line. In this case, reduce throttle to 3-4 notches above idle at the Key Point instead of 2-3 notches. Remember more throttle means a slower descent rate and this compensates for the extra "distance".

That's it! The pilot needs to complete only one task at a time, no matter the wind conditions or the aircraft being flown. One size does fit all. Is it any wonder that full size pilots use this pattern? There is even an easy way to teach, or to learn, how to fly this approach. Again, there is only one change required. Raise the Downwind altitude from 200 to 300 feet. The student flies the approach as described. Instead of landing however, the plane crosses the intended touchdown point while still 100 feet high. The student then adds full throttle, climbs back to 300 feet and re-enters the Downwind. As the student becomes better at flying the pattern approach, begin to lower the Downwind's altitude about 25 feet at a time.

Most times, student pilots make their first landing without even realizing that they are landing! This eliminates the dreaded "fear of the ground" syndrome that affects some students when they see their plane and the ground in their sight picture for the first time. They are down before they even realize what is happening.

In addition, the full-throttle climb recoveries to Downwind altitude teach the student pilots how to do a proper "go-around" or "missed approach" if their landing attempt starts to go the wrong way. The constant approach and climb practice even makes "touch and goes" easier for students to learn.

One other note, what happens if the little fan thingy in front of the engine stops during the approach? Anywhere past the Key Point, turn towards yourself, or the middle of the runway, immediately. If short of the Key Point, make a very small standard pattern and land.

Trainers glide slowly but do not cover a lot of ground distance in the glide. Apply only enough up elevator to maintain the same descending attitude used on the powered approach. If the plane appears to be landing short of the runway, LOWER the nose (release some up elevator) by about 10 degrees. DO NOT apply up elevator. More up elevator will slow the plane and make it land even shorter. Lowering the nose increases the airspeed and therefore the ground distance covered. Most trainers will make the runway from anywhere in this pattern if the engine quits.

The best landing engine rpm varies with the plane being flown. Most 40-60 sized trainers should be set so that the high trim idle is 2800-3000 rpm on the ground. Moving the throttle trim to half way should result in 2300-2400 rpm. Full low throttle trim should shut the engine off. Fly with the high trim to insure the engine doesn't quit during the flight. Reduce the trim to halfway just before entering the landing pattern. Shut the engine off before picking up the plane.

Appendix B. Park Pilot Aircraft

AMA Park Pilot flyer model definition: The AMA currently defines a park flyer as a model weighing less than two (2) pounds that is incapable of reaching speeds of faster than 60 mph. It must use electric power for propulsion, be remotely controlled, and remain within the pilot's line of sight at all times.

The STARS clubs recognizes Park Pilot aircraft and pilots and they are subject to the same rules and regulations as regular members. A Park Pilot student must be a member of AMA in order to participate in the STARS Flight Training Program.

Safety is a primary concern of all members. Please read the STARS Field Rules and Protocol section.

Park Pilot aircraft can by their very nature pose certain problems. Most Park Pilot aircraft are quite small and lightweight. Many are unable to take off or land on a grass field and readily subjected to the effects of the wind. If they are unable to taxi and take-off like their larger counterparts, they may have to be hand launched. Likewise, they may be unable to land on the runway because the wheels are too small for a grass field.

Some of the new Park Pilot aircraft have flight stabilization systems - and those flight systems may help the pilot recover from a bad situation. Unfortunately, most Park Pilot aircraft are not able to be "buddy-boxed" because they have special, proprietary transmitters.

A student that brings a Park Pilot aircraft to the flight school must fly with an instructor even if it has a flight stabilization system.

A Park Pilot student that desires to fly at the STARS field and enlist the help of the flight school must abide by the flight school rules along with other non-Park Pilot students. His/her aircraft will go through a check out procedure and the pilot must be both willing and able to fly the aircraft. Most Park Pilot aircraft are not recommended for students under 14 years of age because of maturity issues. The flight school may accept or reject, at its option, any student they feel are not capable of participating in the flight school.

A Park Pilot that graduates from the Park Pilot flight school is not qualified to fly larger radio controlled model aircraft. Further training will be necessary before becoming a fully qualified pilot. The additional training may include set-up, trimming, engine tuning (if applicable), landing and taking-off depending on the size and type of aircraft.