The Spirits of St. Louis R/C Flying Club, Inc.

AMA Charter No. 396

Official Flight Training Program

The Spirits of St. Louis R/C Flying Club, Inc.

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Thanks

A special thank you to Bob Gizzie for his assistance in gathering information, reviewing methods of instruction, and fact checking this document.

Thanks to Walt Wilson and his lovely wife for taking the time to edit my text into a comprehensible manual.

1 Introduction

The purpose of any model aircraft instruction program is to assist and offer direction to new pilots while they safely learn the hobby. This program is no different. The ideas and requirements set forth in this document are intended to make us better instructors, help newcomers learn more completely, and ensure that as an Introductory Pilot Instructor you comply with all The Spirits of St. Louis R/C Flying Club, Inc., hereafter known as "The Spirits" and AMA procedures and regulations. Additionally, this contains a compilation of selected documents, procedures and regulations set forth by the AMA and the Spirits pertaining to model aircraft flight instruction, introductory flights, and general flight safety.

One of the best ways to get someone interested in model aviation is to give them the opportunity to fly a model plane. The Spirits have at least two events a year in which we invite newcomers to experience model aviation by controlling a model aircraft themselves. Typically, during Boy Scout day and our Annual Open House, we introduce dozens of prospective new pilots and new members to the hobby. It is you, the Instructor Pilot, that makes this impression last and helps develop the desire for them to continue with the hobby.

It is imperative that when we introduce these prospective members to model aviation that their first impression is a positive one. We hope to increase the prospective member's interest in the hobby and our club through standardization of our instruction program, readiness of our training aircraft, condition of our field, and positive communication from our Introductory Pilot Instructors.

Instructors participating in this program are expected to comply with the guidelines and regulations set forth herein. These guidelines are not intended to restrict any particular instruction style. They are set in place in order to present a standardized appearance to newcomers and comply with The Spirits and AMA regulations.

1.1 Word Usage

Within this document certain words have special meaning. Below is a list of those words and the specific meaning that shall be applied to that word as it occurs within this document:

Shall- Is used to indicate a mandatory requirement.

Should- Is used indicate a nonmandatory but preferred method of accomplishment.

May- Is used to indicate an acceptable method of accomplishment

Warning - An operating procedure, practice, etc., which if not correctly followed, could result in personal injury or loss of life.

Caution - An operating procedure, practice, etc., which, if not strictly observed, could result in damage to, or destruction of, equipment.

Note - An operating procedure, condition, etc., which is essential to highlight.

Newcomer - An individual that participates in an intro flight and has not been a previous member of The Spirits

Introductory Pilot Instructor -A current AMA member, a current member in good standing with The Spirits, and recognized by the AMA as an Introductory Pilot Instructor.

Flight Instructor- A current member in good standing with The Spirits recognized as an individual with the necessary qualifications to perform duties as a flight instructor. The Flight Instructor is not allowed to conduct intro flights.

Introductory Flight or Intro Flight - Any flight in which flight instruction is given to a newcomer.

1.2 Goals

The goals of this publication are:

- Provide the Flight Instructor with a basic understanding of how and why people learn.
- Discuss some techniques of instruction and evaluation.
- Ensure compliance with Academy of Model Aeronautics (AMA) insurance requirements.
- Standardize flight instruction techniques used at The Spirits field
- Comply with The Spirits safety and regulatory policies.
- Comply with AMA safety policies.
- Meet or exceed the requirements of an AMA Gold Leader Club.

1.3 References

The following documents are referenced in whole or part by this program of instruction and shall take precedence over any policy stated within this document:

- AMA document 105, National Model Aircraft Safety Code
- AMA document 708, Leader Club Award Application
- AMA document 911, Flying at AMA Chartered Club Sites
- AMA document number 917, Intro Pilot Program and Application
- AMA document number 921, Introductory Pilot Instructor Criteria
- AMA document manual, Membership Manual
- AMA document guide, Newcomers Guide
- Bylaws, December 14, 2011, The Spirits of St. Louis R/C Flying Club, Inc.
- Constitution, The Spirits of St. Louis R/C Flying Club, Inc.
- Safety Rules, December 14, 2011, The Spirits of St. Louis R/C Flying Club, Inc.
- Field Layout, 2011, The Spirits of St. Louis R/C Flying Club, Inc.
- One Week to Solo, 2005, 1st U.S. R/C Flight School
- How to Get Started with Radio Control Aircraft, 2012, The Spirits of St. Louis R/C Flying Club, Inc.

Note:

Always check for updated versions of these reference documents at the AMA,modelaircraft.org, and the Spirits' website spiritsofstl.com.

2 Eligibility

Flight instruction at The Spirits' field is divided into two distinct categories. It is critical that the Flight Instructor understands these two categories as detailed below.

2.1 Intro Flight Instruction

An Intro Flight is performed with an individual that has not previously been a member of The Spirits and is typically not a member of the AMA. This flight is a one time opportunity to introduce the newcomer to model aviation. To comply with all regulations, and ensure adequate insurance coverage, the newcomer must complete the proper paperwork and only fly with a Spirits / AMA Introductory Pilot Instructor. These flights are done to encourage interest in the hobby and recruit new members to the club. A typical flight lasts approximately 5 to 10 minutes.

Note

Only current members, in good standing, of The Spirits, who are AMA Introductory Pilot Instructors recognized by the AMA during the current calendar year, are allowed to conduct Introductory Flights with non-AMA members at The Spirits field.

2.2 Continuing Flight Instruction

Continuing flight instruction shall only be given to those individuals that possess a current AMA card and are current members in good standing with The Spirits.

Trainer aircraft owned by The Spirits **shall not** be used for any continuing flight instruction. Individuals that wish to receive continuing flight instruction should purchase their own flight equipment. It is acceptable If an instructor or friend wishes to allow use of their equipment for continuing flight instruction by a member. However, the equipment owner/member assumes all risk to their aircraft and equipment and The Spirits shall not be liable for any damages to any equipment used during continuing flight instruction.

Continuing flight instruction should be accomplished using The Spirits Official Flight Training Program. Additionally, continuing flight instruction should be received from an instructor acknowledged by The Spirits. However, this does not prohibit any Spirits' member from providing flight instruction to family or friends as long as they are current AMA members and members in good standing with The Spirits.

Note

Providing continuing flight instruction by any member of The Spirits to any individual that is not a current AMA member and a member in good standing with The Spirits. is strictly prohibited and may violate the club's insurance coverage. Newcomers may fly up to 4 times as a guest, with a Spirits Intro Pilot Instructor, within 60 days of signing up for the AMA Introductory Pilot Program.

3 Equipment

3.1 Intro Flight Equipment

The Spirits has a long tradition of providing trainer aircraft and support equipment for the purpose of flight instruction. Unfortunately, over the years, many of these aircraft were lost, due to maintenance issues. Trying to maintain a fleet of trainer aircraft that are only actively used two times annually is difficult and burdensome on a few club members. To that end, The Spirits have decided to minimize the fleet of trainer aircraft and try another option. In order to ensure that adequate aircraft are available for introductory flights The Spirits have adopted a new trainer aircraft policy.

Any member that becomes an Introductory Pilot Instructor and allows use of their personal aircraft for intro flights with newcomers shall be afforded certain club benefits. The club member's aircraft shall only be used for air work during an intro flight under the primary control of the aircraft owner. The Introductory Pilot Instructor shall be assigned a dedicated buddy-box, compatible with their primary transmitter, if available. The buddy-box shall remain property of The Spirits and must be returned to The Spirits upon the request of the Chief Flight Instructor or any elected board member. Additionally, the Introductory Pilot Instructor shall receive the following from The Spirits:

- 1 gallon, Nitro fuel, 10% or 15%, castor oil or synthetic

Or

- equivalent compensation

In order to receive the benefits above, the Introductory Pilot Instructor shall actively participate in at least one of the major club events that promotes newcomer flying, such as the Spirits' Open House, Boy Scout Day or conduct at least 5 intro-flights with newcomers and file all of the required paperwork with the Chief Flight Instructor and/or the AMA. Additionally, the Introductory Pilot Instructor should make themselves available on an as needed basis to provide introductory flights to newcomers during other times as their schedule permits.

See the Section 4, "Instructor Pilots" for more details.

3.2 Trainer Aircraft

Generally, all trainer model aircraft are controlled the same way. Four channels Ailerons, elevator, rudder, and throttle movements are standard in most trainer aircraft. A good trainer design should have the following features:

- A flat – bottom wing
- A thicker airfoil
- A high wing configuration
- Wing dihedral
- A constant – cord wing

When selecting a primary trainer aircraft size should be a consideration. Here are some of the advantages of using a larger trainer aircraft:

- Larger models appear to fly slower and therefore improve a newcomer's sense of coordination and improve thinking time.
- Larger models increase visibility at longer distances.
- Ultimately, the primary advantage of flying larger models is greater stability in windy conditions.
- Typically, a .40 to .60 or equivalent engine size aircraft makes a good trainer.

Remember that a model's responsiveness is dictated by its control throws. The larger the control surface deflection, the more difficult it may be for a student to control the aircraft. Using dual – rates to reduce control throws during an Introductory Flight may be a good idea. It is up to the instructor to determine what is appropriate and what their comfort level is.

With the advancement of electric motors and batteries, electric-powered trainers are now very practical. Depending upon aircraft configuration and battery capacity, some of these trainers can stay in the air for 15 min. or more. Since these aircraft do not require engine adjustment, and cleanup is all but nonexistent, they make excellent trainers.

3.3 Equipment Suggestions for Newcomers

The insert provided with How to Get Started with Radio Control Aircraft, 2012, provides a list of possible trainer aircraft and the minimum support equipment required for each aircraft. Although not all-inclusive, it is a good place for a new pilot to start. If available, a copy of this brochure should be given to each newcomer. A copy of that document may be downloaded from The Spirits' website.

Here are some buddy-box basics:

When using a buddy-box the instructor controls the master transmitter and communicates with the aircraft's receiver. The master transmitter has its power turned "On" and its antenna fully extended or in the proper position. The master transmitter is connected to the slave transmitter via a buddy-box cable. The slave transmitter does not transmit a signal over the radio waves. Instead, the slave transmitter's signal is routed through the master transmitter to the aircraft's receiver, via the buddy-box cable.

Buddy-box cables for Futaba transmitters may have many different shapes. They may be square, round, or rectangular. Make sure that you have the right buddy-box cable before going to the field and trying to connect a slave transmitter to your master transmitter.

Buddy-box cables for JR and Spektrum transmitters are typically mini-stereo pin style. However, there are buddy-box cables available that have many different connectors on them. These cables may allow one master transmitter to connect to a variety of different slave transmitters, even different manufacturers.

A buddy-box for a Futaba transmitter does not require a battery. It receives all of the power it needs to operate from the master transmitter through the buddy-box cable. A buddy-box for a JR or Spektrum transmitter **must** have a properly charged battery installed. In both cases, the slave's transmitter power switch is always "*Off*".

Before flight, the Flight Instructor shall verify the direction and travel of all aircraft control surfaces and throttle prior to starting the aircraft's engine. This process shall be conducted first with the master

transmitter and then verified with the slave transmitter. The position of all control surfaces and throttle shall be the same on the master and slave transmitters.

> **Note**
>
> If the control surfaces and throttle on the slave transmitter cannot be set to match the master transmitter, no flight shall be attempted.

See the appendices at the end of this document for manufacturer's notes on how to setup buddy-boxes for a few select radios.

4 Instructor Pilots

What makes a good flight instructor? Do most skilled pilots make good instructor pilots? Sometimes yes; sometimes no. The foundation of a good Instructor Pilot is built upon their desire and ability to share their knowledge. In order to do this the Flight Instructor must have a good foundation of basic flight skills, good communication skills, and a desire to help others learn. With these three building blocks, a strong foundation is formed on which a great Flight Instructor can rise.

The AMA's Guide for Introductory Pilot Instructor Selection Criteria and Flight Proficiency Demonstration is a good document that discusses what makes a good Flight Instructor. This document is attached in appendices for your review. Although this document provides a great deal of information about the technical capabilities required of a Flight Instructor, and addresses the appropriate demeanor of a good instructor, it falls short in one area.

All of the technical knowledge and good intentions possible do not necessarily allow for the most comprehensive transfer of knowledge from one individual to another, or make the best Flight Instructor. In order to accomplish a positive transfer of learning, a Flight Instructor must understand how and why people learn, why we forget, and why sometimes simple tasks are difficult for a student to grasp. Developing this understanding of how people learn is addressed in a process called Method of Instruction or MOI.

5 Method of Instruction (MOI)

This section contains a selection of instructional concepts used by many civilian and military Flight Training Programs the world over. This information was developed for use during the instruction of full-scale aircraft operations. Some may consider this process overkill for learning how to teach someone to fly a toy aircraft. However, no matter what you are teaching, instruction is the job of an instructor; the student cannot extract the information from between your ears. Knowing how and why people learn makes it easier for you to help them learn. By taking a few minutes to familiarize yourself with the concepts in this section you will find that you understand your students better and will become a better instructor.

There are many model aircraft instructors with a great deal of experience and just as much resistance to anything that may be considered change. I suggest that the information and concepts presented in

this section are not change. As you read this and analyze your own teaching techniques, I am sure you will find that you apply most of these concepts already, but may have not known why. Keep an open mind as you read this section, and associate your own experiences with the different concepts. In most cases, you will find that your beliefs and techniques used during instruction are reinforced here.

5.1 Human Behavior

To be an effective instructor you need to first understand human behavior, apply this understanding to the process of learning, and exercise control over yourself and the teaching environment. Fundamentally, flight behavior is the ability to perform a task within designated parameters or the ability to group several tasks together. In order to understand how to accomplish this effectively you need to understand the three personality elements.

The personality is divided into the cognitive, affective, and behavioral elements. An understanding of the interrelationship between cognition, affectation, and behavior sets the stage for an understanding of how people learn and how to enhance that learning through instruction.

5.1.1 Cognition

The cognitive element is the mental or intellectual part of the pilot. It is the element of the brain that collects and orders information. When a pilot studies and learns all the steps required to perform a particular task, they are using the cognitive process. When the student orders this information into logical sequences, they are also using cognition. Cognition is the process of storing and ordering information and the process of acquiring a conscious awareness of events and then attaching meaning to them. The cognitive element may be thought of as the "Brain".

5.1.2 Affectation

The affective element of the pilot personality includes their feelings, attitudes, values, and emotions. An affectation is a feeling, attitude, value, or emotion. The affective element causes that feeling of discomfort when someone with whom you are flying does not follow the proper safety procedures and the feeling of panic when danger is imminent. Anger, fear, and confidence come from the affective element. The affective element may be thought of as the "Heart".

5.1.3 Behavior

Behavior is the observed physical action or response. Oral explanation and control inputs are behavior. Behavior is a physical manifestation or "Hands and Feet".

5.2 Learning

Simply put, learning can be defined as a change in behavior as a result of experience. All learning comes through experience.

Learning is always an individual process. The instructor cannot do it for the student; knowledge cannot be poured into the student's head. The student can only learn from their individual experiences. A person's knowledge is a result of experience and no two people have had identical experiences. Even when observing the same event, two people react differently; they learn different things from and according to the manner in which the situation affects their individual needs.

All learning is by experience, but it takes place in different forms and in varying degrees of richness and depth. For instance, some experiences involve the whole person; others, only the ears and the memory. Therefore, the instructor is faced with the problem of providing experiences that are meaningful, varied, and appropriate. For example, by using repeated drills, students can learn to say a list of words, or by rote, they can learn to recite certain principles of flight. However, they can make them meaningful only if they understand them well enough to apply them correctly to a real situation. If an experience challenges the learner, requires involvement with feelings, thoughts, memory of past experiences, and physical activity, it is more effective than an experience in which all the learner has to do is commit something to memory.

Students do not soak up knowledge like a sponge absorbs water. The instructor cannot assume that students remember something just because they were present when the task was discussed. Neither can the instructor assume that the student can apply what they know because they can repeat the correct answer from a book.

5.3 Laws of Learning

The following laws of learning are adapted from various civilian and military flight instruction programs around the world. Simply put, these laws of learning provide an insight into the learning process and they are included here for that reason.

Here is a pneumonic to help you remember the laws of learning (PIERRE):

P - primacy

I - intensity

E- exercise

R- readiness

R- recency

E -effect

5.3.1 Primacy

What is learned first is learned best. For the instructor, this means what is taught must be right the first time. Unteaching is much more difficult than teaching. Instructors have a difficult time unteaching bad habits and reteaching correct ones. Every student should be started right. The first experience should be positive and functional and lay the foundation for all learning that is to follow.

5.3.2 Intensity

A vivid, dramatic, or exciting learning experience teaches more than a routine or boring experience. A student is likely to gain greater understanding of stalls by performing them rather than from merely reading about them. The law of intensity then, implies the student will learn more from the real thing than from a substitute. In contrast, flight instruction in the classroom, or on a simulator, imposes limitations on the amount of realism that can be brought into teaching. The instructor should use

imagination approaching reality as closely as possible during ground instruction. Mockups and other teaching aides add vividness during ground school instruction.

5.3.3 Exercise

This law states that those things most often repeated are best remembered. It is the basis of practice and drill. The human memory is not infallible. The mind can rarely retain, evaluate, and apply new concepts or practices after a single exposure. Students do not learn to perform crosswind landings during one instructional flight. They learn by applying what they have been told and shown. Every time practice occurs, learning continues and is reinforced. The instructor must provide opportunities for students to practice, or repeat tasks, and must see that this process is directed toward a goal. All practice must be done properly, and to a standard, to reinforce learning and establish good habits.

5.3.4 Readiness

Individuals learn best when they are ready to learn, and they do not learn much if they see no reason for learning. Getting students ready to learn is usually the instructor's responsibility. If students have a strong purpose, a clear objective, and a well-fixed reason for learning something, they make more progress than if they lack motivation or do not understand the goal. Readiness implies a degree of single-mindedness and eagerness. When students are ready to learn, they meet the instructor at least halfway, and this simplifies the instructor's job.

Under certain circumstances, the instructor can do little, if anything, to inspire the student's readiness to learn. If outside responsibilities, interest, or worries weigh too heavily on their minds, if their schedules are overcrowded, or their personal problems seem insoluble, students may have little interest in learning. If this occurs flight training should be postponed until the student is ready to learn.

5.3.5 Recency

Things most recently learned are best remembered. Conversely, the further a student is removed time-wise from a new task, the more difficult it is to remember it. It is easy, for example, for a student to recall a throttle setting used a few minutes earlier, but it is usually impossible to remember an unfamiliar one used a week earlier. Instructors recognize the law of recency when they carefully plan a summary for a ground school lesson or post flight critique. The instructor always repeats, restates, or emphasizes important matters at the end of the lesson to make sure that the student remembers them.

5.3.6 Effect

This law is based on the emotional reaction of the learner. It states that learning is strengthened when accompanied by a pleasant or satisfying feeling, and that learning is weakened when associated with an unpleasant feeling. An experience that produces feelings of defeat, frustration, anger, confusion, or futility is unpleasant for the student. If, for example, an instructor attempts to teach landings during the first flight, the student is likely to feel inferior and be dissatisfied.

Instructors should be cautious. Impressing students with the difficulty of a flight maneuver can make teaching the maneuver difficult. Usually it is better to tell students that a problem or maneuver, although difficult, is within their capability to understand or perform. Whatever the learning situation, it should contain elements that affect the students positively and give them a feeling of satisfaction.

5.4 How People Learn

Initially, all learning comes from experience or perceptions, which are directed to the brain by one or more of the five senses (sight, hearing, touch, smell, and taste). Psychologists have determined through experiments that normal individuals acquire about 75% of their knowledge through the sense of sight, 13% through hearing, 6% through touch, 3% through smell, and 3% through taste. They have also found that learning occurs most rapidly when information is received through more than one of the senses.

Perceiving involves more than the reception of stimuli of the five senses. Perceptions result when a person gives meaning to sensations. People base their actions on the way they believe things to be. An experienced pilot perceives engine sounds quite differently than an inexperienced student.

Perceptions always depend on one's goals and values. Every experience and sensation is funneled into an individual's central nervous system and is colored by the individual's own beliefs and value structures. Incorporating as many senses as possible and understanding how the student may perceive the instruction given is critical to providing a good opportunity for learning.

5.5 Levels of Learning

Learning occurs at any of several levels. There are four levels of learning. In order of complexity, they are:

- Rote
- Understanding
- Application
- Correlation

5.5.1 Rote

The lowest level of learning, rote learning, is the ability to repeat back something, which one has been taught, without understanding or being able to apply what has been learned. A good example of this, is telling a student the different control surfaces on an aircraft. Then asking him to repeat what he just learned. The student may be able to name the control surfaces. However, the student does not understand what the control surfaces do.

5.5.2 Understanding

With proper instruction on the effect and application of transmitter stick movement and control surface reaction, coupled with their use in flight, the student can develop these old and new perceptions into an insight on how control surfaces and transmitter stick movements affect the aircraft. At this point, the student has developed an understanding of the procedure for controlling the aircraft in flight. This understanding is basic to effective learning, but may not necessarily enable the student to control the aircraft properly on their first attempt.

5.5.3 Application

When the student understands how the transmitter sticks and control surfaces work to control the aircraft and has practiced until there is consistency during the flight maneuvers, the student has

developed the skill to apply what has been taught. This is a major level of learning and one which many instructors are often willing to stop. Discontinuing instruction at this point and directing subsequent instruction exclusively to other elements of performance is characteristic of piecemeal instruction, which is usually inefficient. It violates the "building block" concept of instruction by failing to apply what has been learned to future learning tasks.

5.5.4 Correlation

The highest level of learning, which should be the objective of all instruction, is that level at which the student becomes able to associate an element which has been learned with other segments, or blocks of learning, or accomplishment. The other segments may be items or skills previously learned, or new learning tasks to be undertaken in the future. The student who has achieved this level of learning has developed the ability to combine the elements of this particular task with the performance of more combined and complex flight maneuvers, such as figure eights and loops.

5.6 Forgetting and Retention

5.6.1 Forgetting

An understanding of why people forget may point the way to helping them remember. Here are several theories that account for forgetting.

5.6.1.1 Disuse

It is long been argued that person forgets those things which are not used. A high school or college graduate is saddened by the small amount of factual data retained several years after graduation. Since the things which are remembered are those used on the job, a person concludes that forgetting is a result of disuse.

5.6.1.2 Interference

One theory holds that people forget a thing because another experience has overshadowed it, or that the learning of similar things has intervened. This theory might explain how the range of experiences after graduation from school causes a person to lose knowledge. In other words, new events displace many things previously learned. It would appear that closely similar material seems to interfere with memory more than dissimilar material and material not well learned suffers most from interference.

5.6.1.3 Repression

Freudian psychology advances the view that some forgetting is due to the submersion of ideas into the unconscious mind. Material that is unpleasant or produces anxiety may be treated this way by the individual, but not intentionally. It is subconscious and protective. Although not appearing to account for much forgetfulness repression does explain some cases of forgetting.

5.6.2 Retention of Learning

Each of the theories of forgetting implies that when a person forgets something, it is not actually lost; rather it is unavailable for recall. The instructor's problem then, is to make certain that the students learning is always available for recall. The following suggestions may help:

Teach thoroughly and with meaning. Material thoroughly learned is highly resistant to forgetting. Meaningful learning builds patterns of relationship in the student's consciousness. Whereas rote learning is superficial and not easily retained. Meaningful learning goes deep, because it involves principles and concepts anchored in the student's own experience.

There are five significant principles which are generally accepted as having direct application to remembering:

5.6.2.4 Praise

Praise stimulates remembering. Responses which give a pleasurable return tend to be repeated. Absence of praise or recognition tends to discourage one, and any form of negativism in the form of a response tends to make its recall less likely.

5.6.2.5 Recall

Recall is promoted by association. Each bit of information or action which is associated with something to be learned tends to facilitate its later recall by the student. Unique or disassociated facts tend to be forgotten unless they are of special interest or application.

5.6.2.6 Favorable Attitude

Favorable attitudes aid retention. People learn and remember only what they wish to know. Without motivation, there is little chance for recall. The most effective motivations are those based on positive or rewarding objectives.

5.6.2.7 Involve Many Senses

Learning with all our senses is most effective. Although we generally receive what we learn through the eyes and ears, other senses also contribute to most perceptions. When several senses respond together, fuller understanding and a greater chance of recall is achieved.

5.6.2.8 Meaningful Repetition

Meaningful repetition aids recall. Each repetition gives the student an opportunity to gain a clearer and more accurate perception of the subject to be learned, but mere repetition does not guarantee retention. Practice gives an opportunity for learning, but does not cause it. Further, it is believed that three or four repetitions close together provide the maximum effect, after which the rate of learning and probability of retention fall off rapidly.

5.7 Transfer of Learning

During a learning experience, the student may be aided by things learned previously. On the other hand, it is sometimes apparent that the previous learning interferes with learning the current task. Consider the learning of two skills, A and B. If the learning of A helps to learn B, positive transfer occurs. If learning A hinders the learning of B, negative transfer occurs.

Negative transfer primarily occurs when a student has had multiple instructors or attempts to learn on their own without guidance. Instructor A may have had a particular technique for coordinated turns. Instructor B's technique is completely different in the way that it is explained and executed. This

confuses the student as to which operation is correct and causes negative transfer of learning. One way to prevent negative transfer of learning is to have a standardized flight instruction program.

5.8 Barriers to Effective Communication

Probably the greatest single barrier to effective communication is the lack of a common core of experience between instructor and student. Communication can be effective only to the extent that the experiences, physical, mental, or emotional of the people concerned are similar.

Many people believe that words transport meaning from speaker to listener in the same way that a truck carries bricks from one location to another. The words never carry precisely the same meaning from the mind of the instructor to the student. In fact, words do not transfer meanings at all. An instructor's words cannot communicate meaning to a student unless they have had some experience with the objects, or concepts, to which these words refer.

6 Flight Training

6.1 Standardized Terminology

In order to effectively communicate and help students learn it is important to have a common frame of reference. Often, students may receive instruction from multiple flight instructors, all highly skilled, with their own techniques and sometimes their own terminology. This can be confusing for the student and why, as instructors, we should use a standardized set of terminology accepted within our hobby. Please refer to Section 7 for a list of these terms. If you find an inaccuracy, omission, an item you think should be removed, or a term added, please send an e-mail to the Chief Flight Instructor stating your concern.

Standardized terminology not only applies to the description of physical components but to basic aircraft operation as well. Standardization should also apply to the terminology used while giving verbal instruction to the student during flight training.

Students often struggle with understanding how much "a little" right aileron is. Additionally, the terms push, pull, right, left, left rudder, right rudder, increase throttle, reduce throttle, etc. are often foreign to the newcomer. Obeying the law of learning, primacy, we should do everything possible to standardize how we conduct our introductory flights and continuing flight instruction to give the student the best opportunity to learn.

6.2 Introductory Flights

Introductory Pilot Instructors are authorized to instruct newcomers, non-AMA and non-Spirits' members, under the conditions stated in AMA document 917 and The Spirits Flight Training Program. Introductory Pilot Instructors are responsible for the safe operation of the radio-controlled aircraft used during the Intro Flight, even while the aircraft is controlled by the newcomer.

Intro flights shall be conducted at an altitude of at least two mistakes high and, when possible, avoid the flow of other aircraft in the traffic pattern. It is the responsibility of the Introductory Pilot Instructor to maintain clearance from other aircraft.

6.2.1 AMA and Spirits Paperwork for Introductory Flights

Newcomer packets containing the following paperwork, at a minimum, shall be provided by the Intro Pilot Instructors to give to each newcomer prior to flight training. These packets are available for download from our website or from the Chief Flight Instructor.

1. The following documents should be printed and inserted into the " How to Get Started with Radio Control Aircraft", handout and given to each Newcomer.
    a. Suggested aircraft and support equipment for Newcomers
    b. Newcomer printed packet (documents included in packet)
        i. A copy of the AMA National Model Aircraft Safety Code, required by AMA
        ii. A copy of page 1, AMA document number 917, AMA Introductory Pilot Program, required by AMA.
        iii. Spirits' Safety Briefing
        iv. Spirits' ground school for Intro Flights
        v. Student Flight Log
    c. Individual documents to printed and inserted
        i. Student Pilot Registration Form #2 *(To be completed by the Newcomer and Introductory Pilot Instructor and filed as required by the AMA and Spirits' Flight Training Program.)* required by AMA
        ii. An AMA membership application for the current year, Form #902
        iii. Spirits' tri–fold brochure (with Spirits' membership application)

6.2.2 Important Paperwork to Be Filed

Each Introductory Pilot Instructor shall be responsible for completing all required forms for an Intro Flight. Specifically, the AMA Student Pilot Registration Form #2 and any other forms that may be required from time to time by The Spirits for each newcomer he or she acts as Flight Instructor.

During a club event where Intro Flights are promoted, a single individual may be selected to complete the required paperwork. It is not necessary for that individual to be an Introductory Pilot Instructor. The best time to complete this paperwork is just prior to the safety briefing.

Collection and filing of this paperwork is critical to maintaining AMA insurance coverage for The Spirits. Failure to comply with the AMA's requirements exposes the club, specifically club officers, to litigation in the event of an accident involving a newcomer.

Any questions regarding the completion of the required paperwork shall be directed to the Chief Flight Instructor or The Spirits' Board of Directors.

6.2.3 Safety Briefing

Prior to flight instruction, or ground school, each newcomer shall receive a safety briefing. The safety briefing should be conducted as a group and time allowed for questions at the end of the briefing. At a minimum, the safety briefing shall contain the following information:

- AMA document number 105, AMA Safety Code
  - Section A, General
  - Section B, Radio Control (RC)
- The Spirits' Safety Rules, December 14, 2011 *(check for current revision)*
  - A general introduction to the field layout including, pilot station, flight safety line, taxiways, pit area, pavilion, and restroom.
  - 15. When starting, or running an engine, warn people to stay clear of the prop arc.
  - 16. Direct prop blast away from other aircraft and people.
  - 19. Stand in the pilot box/station area when flying.
  - 21. In the event of problems, announce an emergency and attempt to fly away from the pits and spectators and land immediately.
  - 22. Do not go out on the runway unless absolutely necessary. At any such time, give a loud verbal warning of your presence, making sure that you are not running out in front of an aircraft in motion. Stay only as long as necessary and announce when you are clear of the runway.
  - The flyer of a "dead stick" model, or a model experiencing problems, must shout loudly and clearly warn other persons of the situation. Landing priority will be given immediately.
  - In the normal primary flying area, no flying is to be done south of the striped poles located in line with the Flight Safety Line as shown on the field layout drawing. No flying is allowed over Amrein Road.

6.2.4 Ground School

Before proceeding to the flight line for their first flight, a newcomer shall receive basic ground school instruction. The ground school instruction shall contain the following information at a minimum:

6.2.4.9 Basic Aircraft Components

If time is available, a more detailed discussion of the aircraft and how and why it flies may be used to fill time while newcomers are awaiting their turn to fly. Use the illustration (Figure 1), or a small actual aircraft, to explain these basic aircraft components. During your explanation, try to incorporate a discussion of how the control surfaces work together to maneuver the aircraft. Specifically, cover how the deflection of these control surfaces affects the airflow around the aircraft and cause it to maneuver.

Discuss these components in depth and try to develop the student's understanding of how the aircraft flies. This will make it easier for them to understand how their movements on the transmitter's control sticks translate into different flight maneuvers.

Use the terminology in Section 8 to help standardize your explanation of these components.

At a minimum, the following components shall be discussed before any newcomer has the opportunity to fly an aircraft:

- Propeller, propeller arc
- Engine or electric motor
- Servos
- Fuselage
- Wing
  - Ailerons, left and right
- Horizontal Stabilizer
  - Elevator
- Vertical Stabilizer
  - Rudder
- Receiver
  - Receiver Battery
- Fuel
  - Nitro Fuel
  - Battery, typically lithium polymer

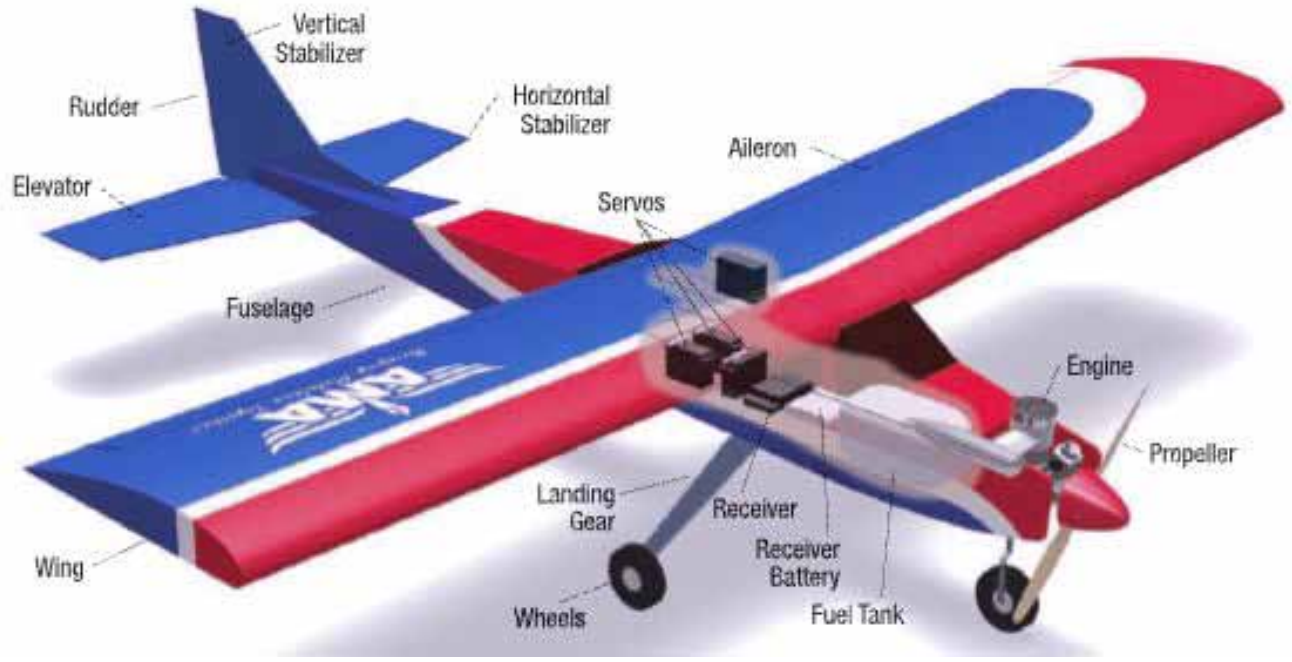


Figure 1 Basic model aircraft components and control surfaces

6.2.4.10 Basic transmitter Operation

Although this may be the first time the student has a model aircraft transmitter in their hands, it is a sure bet it is not the first time that they have held some type of remote control. Most likely they are familiar with Xbox, small remote-controlled cars or helicopters. Use the knowledge that the student already has to build upon as you explain the basic functions of a transmitter for radio controlled aircraft.

Start by explaining how the master and slave transmitters work together with the buddy-box cord. Inform the student that the slave transmitter may be referred to as a buddy-box as well. Show them where the trainer switch on the master transmitter is and explain how it allows you to transfer control of the aircraft to them. Reassure them that if they get into an out-of-control situation with the aircraft that you can easily take control and recover the aircraft.

Before explaining any operation of the transmitter sticks make sure the student understands the following:

- Never drop the transmitter
- Never lay the transmitter down on the control sticks
- Never unplug the buddy box cable
- Never turn the slave transmitter on

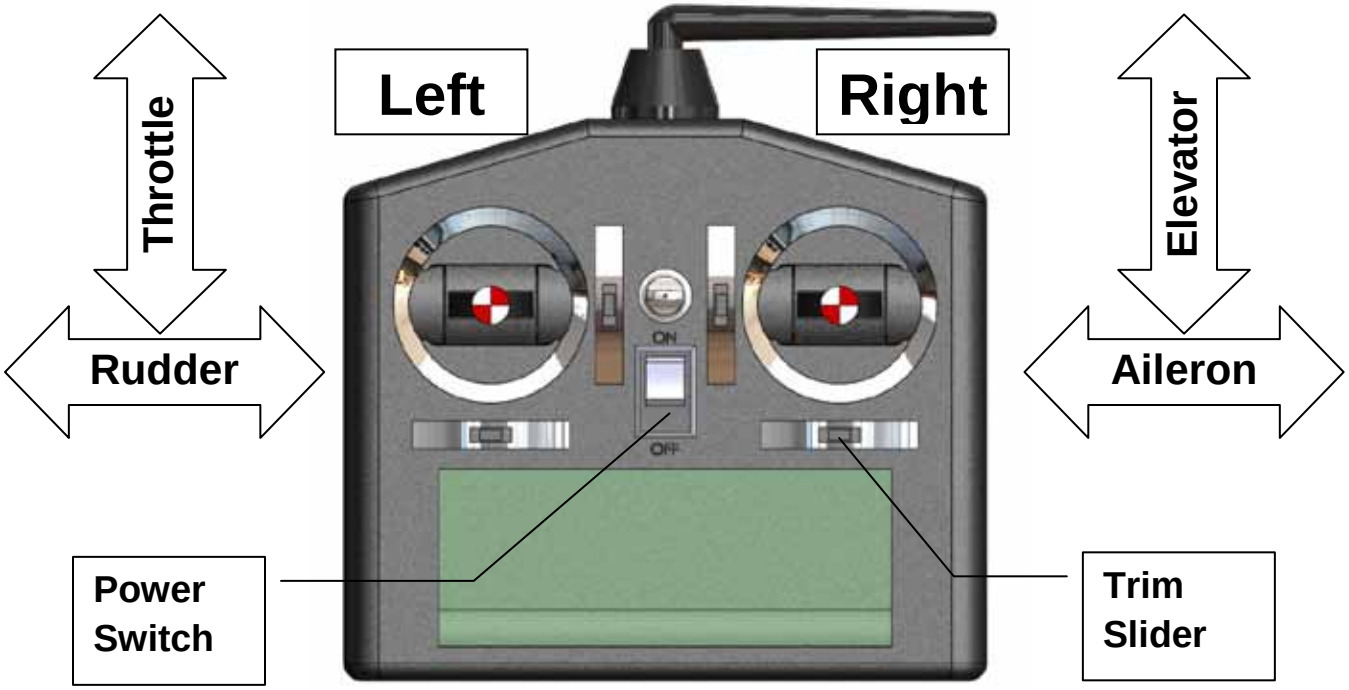
Before proceeding, try to have a couple of buddy-boxes that can be passed among the students for them to look at as you talk about the controls. Young students may have a tendency to go a little crazy with the transmitter. Stop them immediately. Explain to them that the transmitter can be easily damaged and that they should never treat any transmitter as a toy. The transmitter controlling a remote-controlled aircraft that is not respected can cause great injury to bystanders and damage to property.

Explain the following transmitter components and how they control the aircraft's control surfaces and reinforce their knowledge of how the control surfaces affect the aircraft:

- Right Stick, left and right movement
  - Ailerons, roll axis, left and right turns
- Right Stick, push and pull movement
  - Elevator, pitch axis, climb and descend
- Left Stick, left and right movement
  - Rudder, yaw axis, ground steering and left and right turns
- Left Stick, push and pull movement
  - Throttle, propeller/engine speed
- Trim Sliders, the student shall not adjust the trim sliders during the Intro Flight If the aircraft trim requires adjustment, the instructor shall request assistance from a member pilot or other instructor.

- Other Switches; the student shall not cycle or operate any other switches or levers on the transmitter during the Intro Flight.

6.2.4.11 Instructor Commands



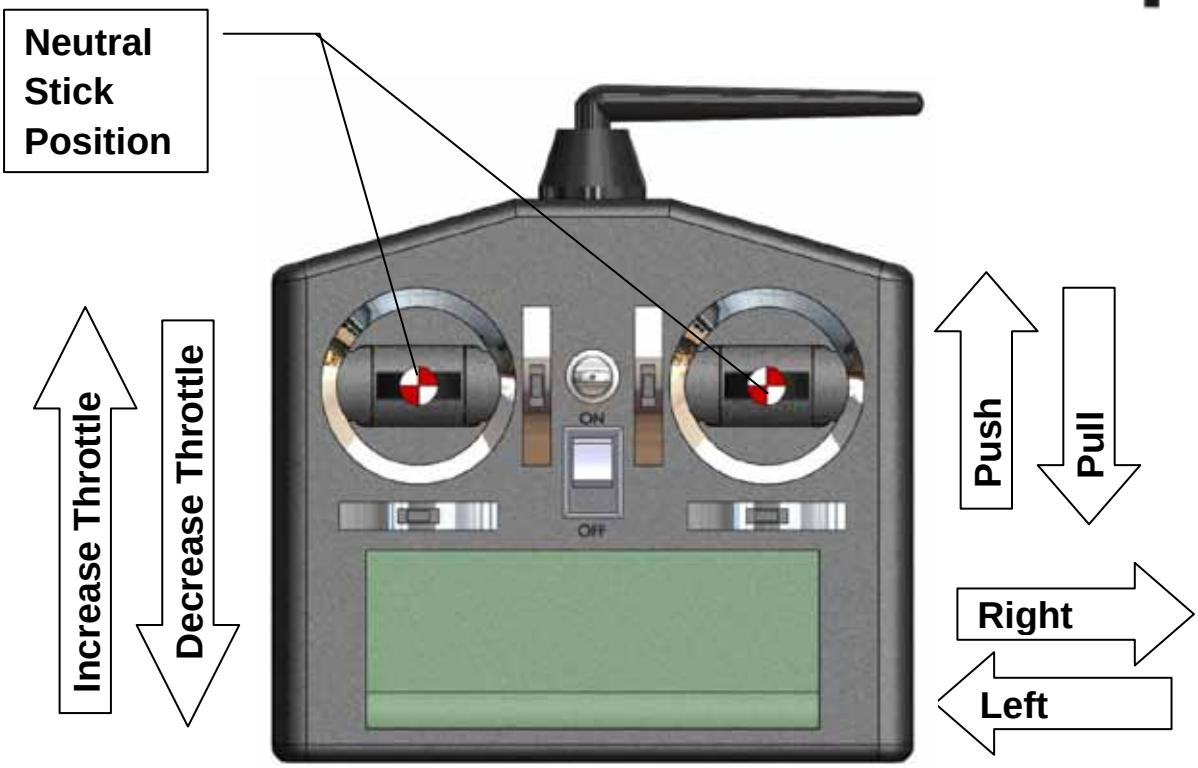
During the intro flight, it is a good time to start using standardized terminology. Even though we may use standardized words during instruction, if the student does not have a frame of reference for that word, it has no meaning to them. You should never assume that a student knows what you are talking about, especially the first time the information is presented. This is why it is critical to discuss specific instructor commands before the student is allowed to control the aircraft.

Review these commands several times with the students prior to them flying. This may seem dilatory and repetitive but, by reviewing these commands and practicing prior to flying, the student will have a more fulfilling experience and have the feeling of being in control. This positive experience is what we wish to convey to every newcomer that participates in an intro flight.

If you have time to fill while students wait for their turn at the flight line, you can try shadow flying. Shadow flying is where you use a small aircraft and have a student or two holding an unused buddy-box or dummy transmitter. As you tell the students to input a stick movement you move the aircraft to simulate what that movement would do. This is a good teaching experience and allows the ground school instructor to reinforce the importance of small and smooth control inputs by the student. If a student seems to be catching on quickly, use a student to control the aircraft and shadow the transmitter control movements of another student. This exercise can also be used to demonstrate the "bump" method of course correction.

Commands that shall be reviewed and practiced by the student prior to proceeding to the flight line are:

- **Push**, to move the right stick toward the top of the transmitter. This movement causes the elevator to deflect downward, thereby pushing the tail of the aircraft up. This stick movement will put the nose of the aircraft into a dive.
- **Pull**, to move the right stick toward the bottom of the transmitter. This movement causes the elevator to deflect upward, thereby pushing the tail of the aircraft down. This stick movement will put the nose of the aircraft into a climb, or as part of the turn.
- **Right**, to move the right stick toward the right side of the transmitter. This movement causes the right aileron to deflect upward and the left aileron to deflect downward, thereby pushing the right wing down and pushing the left wing up. This stick movement will cause the aircraft to enter into a right bank. A banking movement is the first step of turning an aircraft.
- **Left**, to move the right stick toward the left side of the transmitter. This movement causes the left aileron to deflect upward and the right aileron to deflect downward, thereby pushing the left wing down and pushing the right wing up. This stick movement will cause the aircraft to enter into a left bank. A banking movement is the first step of turning an aircraft.
- **Increase Throttle**, to move the left stick toward the top of the transmitter. This movement causes more fuel and air, or electrical power, to go to the aircraft engine, increasing propeller speed. This increase in speed will usually cause the aircraft to climb.
- **Reduce Throttle**, to move the left stick toward the bottom of the transmitter. This movement causes less fuel and air, or electrical power, to go to the aircraft engine, decreasing propeller speed. This decrease in speed will cause the aircraft to descend.
- **Neutral Position**, to release both sticks and allow them to return to their spring-loaded center position on the transmitter. Telling the student to do this is a lot like pressing the reset button on the video game. It allows them to start again from a known position for you and them.
- **Bump**, the act of tapping the right stick left or right and allowing it to immediately return to the neutral position. The bump command shall include the direction of the bump. For example, bump right or bump left. This stick movement imparts a momentary aileron input that allows for minor course corrections. The bump is always a small movement and you always allow the stick to return to the neutral position. If additional course correction is required, bump again. By using the bump method, it reduces the tendency of the student to swerve back and forth across their intended course. Although typically used for aileron control, it can be used for elevator control as well. Unfortunately, the terms bump push and bump pull, do not roll off the tongue very well.



Typically, during an intro flight, the student will primarily control the right stick. From time to time, you may need the student to adjust the throttle position. Be cautious with this. Often, when the students are asked to do this, the throttle changes are a bit unpredictable. It is usually a better idea to ask for the assistance of another member pilot, or instructor, to adjust the throttle on the buddy-box.

Continually reinforce the need for small, smooth, control inputs. At this time it is important to explain that each roll and pitch control input is finished by mirroring the movement in the opposite direction and returning the right stick to the neutral position. Without this critical bit of instruction, the student may have difficulty grasping why a turn turns into a roll or a simple descent turns into a dive.

6.2.4.12 Positive Transfer of Controls

While training a new pilot it is necessary to transfer control of the aircraft from the instructor to the student and from the student to the instructor. As every instructor knows, you have complete control of the aircraft until you activate the trainer switch on the master transmitter. When you engage the trainer switch, usually a spring-loaded switch, control of the aircraft is immediately transferred to the slave transmitter via the buddy-box cable. It is therefore important to understand the terminology and process required to have a positive transfer of control and always know who was flying the aircraft.

The transfer process shall be as follows:

Flight Instructor, "Do you see the aircraft?"

Student, "Yes, I see the aircraft."

Flight Instructor, "You have the aircraft." *(At this time, the Flight Instructor activates the trainer switch.)*

Student, "I have the aircraft." *(The student is now flying.)*

If at any time, the instructor needs to take control of the aircraft for any reason the instructor shall state:

Flight Instructor, "I have the aircraft." *(The instructor now releases the trainer switch.)*

Transfer of aircraft control should only take place when the aircraft is in straight and level flight. Of course, the exception to this is when a student loses aircraft control, and an unsafe situation occurs or the student surrenders the aircraft during a maneuver. Remind the student that they may surrender the aircraft control at any time by stating:

Student, "You have the aircraft." *(The instructor immediately releases the trainer switch and takes control.)*

6.2.5 Intro Flight

Many times, when performing an Intro Flight, the Flight Instructor will already have the aircraft in the air and may have just finished with one or two other students. As each new student is handed off to you take a few seconds to learn their name and tell them how you would like to be addressed. If possible, when new students are presented to an instructor that already has an aircraft in the air, another club member should introduce the student to the instructor and ensure proper handoff of the buddy-box to the new student.

A typical introductory flight consists of simple air work. Straight level flight, simple turns, and course corrections during straight and level flight, are the basis of an Intro Flight. At no time during an Intro Flight shall a newcomer be allowed to take off or land the aircraft. Other flight maneuvers by a newcomer are at the discretion of the flight instructor. Do not try to impress the newcomer with your aerobatic skill or overly state how difficult a maneuver is to accomplish. This is negative reinforcement and will reduce the student's desire to learn.

The focus of the Intro Flight should be for the newcomer to have fun and be excited about radio control aircraft. You have become a Flight Instructor because you enjoy flying and you enjoy sharing your knowledge and experience with others. Ensure that this attitude is presented to, and received, by the newcomer and you will enjoy the experience as much as the newcomer will.

Developing the feeling of being in control is important at this level to the student. The student must feel like they are controlling the aircraft and not just reacting to what they see. This is why ground school instruction is so important to having a good Intro Flight.

When the Intro Flight is complete with one newcomer, another may be right behind him or her. At some point, it may feel like you are working on an assembly line. Remember, that for most newcomers this is their first experience with radio control aircraft. As difficult as it may be, try to convey that same sense of excitement to the last newcomer as you did the first.

If at any time during a club event while conducting Intro Flights you become fatigued, or just need to take a break, it is your responsibility to do so. This is why it is critical for us to have many Introductory Pilot Instructors for these events. By sharing the load no one gets burned out, we get the most newcomers in the air, and hopefully we don't have any aircraft mishaps.

6.2.6 Intro Flight Maneuvers

Only two maneuvers are covered here, straight and level flight, and turns. During the Intro Flight there is rarely time for much more than this. On occasion, you will have a student that has a natural ability and picks up the basic maneuvering techniques very quickly. It is at your discretion if you decide to expose them to other maneuvers. Do not try to impress them with a difficult maneuver, keep it simple. A good maneuver for one of these students is the loop.

These two maneuvers, although simple in their execution, provide the foundation for all other aerial maneuvers. Obeying the learning law of primacy, we must ensure that the student learns these maneuvers correctly the first time. Although the goals of the intro flight are for the student to have fun, and get excited about the radio control hobby, it is incumbent upon the instructor that all instruction ultimately benefits the student's learning process.

6.2.6.13 Straight and Level Flight

Aircraft used for intro flights should already be properly trimmed for straight and level flight between 1/2 and 3/4 throttle. Making sure that the slave transmitter is set up to match the master transmitter and presetting the throttle position on the slave transmitter should make straight and level flight easier for the student to maintain. The student will have the tendency to move the sticks unconsciously. This happens because the student feels if they are not moving something on the transmitter they are not controlling the aircraft.

Teaching and using the aileron bump course adjustment technique allows the student to make course corrections with minimal loss of altitude and establishes confidence in their ability to control the aircraft. If the aircraft has been properly trimmed, there should be little need for elevator input during straight level flight. If, however, altitude correction is required during straight level flight, inform the student to bump-pull or bump-push the right stick to input an elevator correction. If after a couple of inputs to correct altitude the aircraft is still in a descent or radical climb, take control of the aircraft, level the wings and put the aircraft in a position where the student can easily see its orientation. Then return control to the student.

6.2.6.14 Turns

For student to execute a good turn, they need to understand the relationship between the aileron and elevator during a turn.

- Aileron banks the aircraft right or left, but does not initiate a turn. Applying only aileron initiates a roll.
- Elevator initiates a turn once aileron has been applied.
- If aileron is not neutralized after the angle of bank is achieved, the aircraft will continue to roll into a spiral.
- If elevator is not maintained in a constant position during the turn, the turn may widen, become very tight, or put the aircraft into a spiral.

To make the process of learning how to turn an aircraft as easy as 1, 2, 3, try the following steps:

Start the turn from straight and level flight:

1. Apply aileron smoothly to bank the aircraft in the desired direction of turn.
2. When the bank angle is achieved, quickly return the aileron stick to neutral.
3. Immediately apply up elevator stick and hold to maintain the turn.

To roll out from the turn:

4. Return the elevator stick to neutral.
5. Apply aileron smoothly in the opposite direction of the bank to level the wings.
6. Quickly return the aileron stick to neutral.

Return to straight and level flight.

Using this six-step method to learn basic turns reinforces a basic understanding of how control inputs and aircraft control surfaces interact to maneuver the aircraft. A good foundation built here in 10 minutes worth of flight can last a lifetime for the person entering the hobby. If the student grasps this task quickly, try introducing rudder into the turn to perform a coordinated turn.

All maneuvers practiced during any Intro Flight should terminate with the attempt at maintaining straight and level flight and a level turn.

6.2.6.15 Completing the Flight

When it is time to change students, remember to add some positive reinforcement as the student leaves. It is critical for the student to have a positive impression of our hobby.

Those of us that conduct Intro Flights do so because we truly enjoy our hobby and enjoy sharing it with others. Without the work and dedication of Introductory Pilot Instructors, the radio control aircraft hobby misses the opportunity to introduce scores of people to a fun and rewarding activity.

6.3 Continuing Flight Instruction

To be eligible to receive continuing flight instruction at The Spirits field, an individual must comply with the eligibility requirements stated in section 2.2 of this document.

Continuing flight instruction should be accomplished using The Spirits Official Flight Training Program. Continuing flight instruction should also be received by an instructor acknowledged by The Spirits. However, this does not prohibit any Spirits' member in good standing from providing flight instruction to family or friends, as long as they are also current AMA members and members in good standing with The Spirits.

Note:

Trainer aircraft owned by The Spirits shall not be used for any continuing flight instruction.

Note

Providing continuing flight instruction by any member of The Spirits to any individual that is not a current AMA member and a member in good standing with The Spirits. is strictly prohibited and may violate the club's insurance coverage. Newcomers may fly up to 4 times as a guest, with a Spirits Intro Pilot Instructor, within 60 days of signing up for the AMA Introductory Pilot Program.

6.3.1 Ground School

At a minimum, ground school for continuing flight instruction shall consist of those topics detailed in section 6.2.5 of this document. Additionally, the following topics shall also be discussed:

6.3.1.16 All Aircraft

- airframe
  - control surface hinges
  - control surface deflection
  - motor mount
  - landing gear
  - general airworthiness
- electronics
  - receiver type
  - receiver antenna location
  - on/off and arming switches

6.3.1.17 Nitro Aircraft

- Fueling/defueling the aircraft
  - fuel types
  - use of catch tanks
  - shake the clunk to the back
- glow plugs
  - selection
  - how to evaluate
  - connection during engine starting
- propellers
  - selection
  - balancing
  - installation (sandpaper)
- engine
  - priming
  - starting
  - idle adjustment
  - shutdown
  - storage
- receiver battery
  - type and voltage
  - how to charge
  - how to check

6.3.1.18 Electric Aircraft

- Main battery

- type and size
- connection type
- proper handling
- proper charging
- proper disposal

· electronics
- motor
- Electronic Speed Controller (ESC)
- Battery Eliminator Circuit (BEC)
- receiver battery (if required)

· propellers
- selection (ensure a propeller rated for electric motors is used)
- balancing
- installation (sandpaper)

The topics listed above should not be considered all inclusive. Nor, is there any requirement that all of the ground school topics be completed prior to hands-on flight training. It is up to the Flight Instructor to determine when these topics are covered in the course of conducting training.

As flight training progresses, additional ground school sessions are needed to explain more complex operations of the aircraft and flight maneuvers and should be conducted by the Flight Instructor.

6.3.2 Lesson Plans

In a further attempt to standardize flight instruction by The Spirits, it is important to establish a set of guidelines for conducting continuing flight instruction. Rather than reinvent the wheel or cobble something together, research was conducted to locate an existing Flight Training System that would meet our needs. To that end, the book, "One Week to Solo" by David A. Scott appears to meet those needs and was selected.

Introductory Pilot Instructors that also choose to participate in continuing flight instruction at The Spirits shall be provided a copy of this book by Spirits at no charge, upon completion of Flight Instructor training

6.3.2.19 One Week to Solo

The book, "One Week to Solo", shall be considered the official continuing Flight Training System of The Spirits of St. Louis Radio Controlled (R/C) Flying Club, Inc.

Although comprehensive and systematic in its approach to flight instruction, this text cannot address the knowledge and experience of every flight instructor. This book is a good guide and is a proven approach to minimizing the amount of time required for a student to learn to solo.

This book is technically accurate and detailed, and as most books of this type are boring, and at times can be overbearing with the amount of information presented. This is again where the instructor becomes so critical to the learning process. By sharing your experiences while teaching the

fundamentals expressed in the book the student will have a much more enjoyable and complete learning experience.

One Week to Solo also provides a great number of illustrations that are very helpful in explaining certain flight maneuvers during ground school and preflight activities.

6.3.3 Flight Instruction

At the flight line, the Flight Instructor is king. The student does not get to argue with the

Flight Instructor. The Flight Instructor does not get to yell at the student. The Flight Instructor to student relationship should be one of mutual respect. The student's respect for the knowledge and experience of the Flight Instructor, and the Flight Instructor's respect of the student's desire to learn are imparative.

All flight-training sessions should consist of some period of practice, or drill of tasks, learned during the last session. However, constant repetition of the same maneuver may cause performance to drop and bad habits to begin forming. Practice a maneuver a couple of times and move on to another maneuver. Try to incorporate some new information during each training session.

Always try to practice maneuvers that reinforce a previously learned skill, or are the basis of a new maneuver, just prior to teaching the new maneuver. This aids the student by building on information that they are already familiar with.

Sometimes, you may need to break the monotony and let the student do a loop or a split-S or some other type of simple aerobatic maneuver. These maneuvers are very useful in helping a student break through a learning plateau. A learning plateau is when a student achieves a certain level of performance but, for some reason, they have difficulty moving forward. These maneuvers should not be practiced on a continuing basis until after the student has soloed.

Most of all, be yourself and have fun while teaching.

6.3.4 Student Evaluation and Critique

The process of teaching requires us to continually evaluate the student. During flight instruction, it is critical to give instantaneous feedback to the student regarding the maneuvers they are attempting. Feedback should be direct, but not condescending or cruel. Tell the student specifically what was right and what was wrong. What they learn has more to do with pointing out the positive, than harping on the negative.

When pointing out shortcomings, try to express technically and briefly what went wrong, then explain calmly and simply how to correct the issue. It may be necessary for you to take control of the aircraft and demonstrate the maneuver again to refresh the student's memory.

At the end of each flight, take the opportunity to sit down with the student and review what was accomplished. Try this approach:

- Ask the student, "How do you think you did with "X" maneuver?"
- Wait for, and analyze, their response.

- If the response is, "I don't know." there may be a lack of understanding on how to accomplish the maneuver.
- If the response is detailed and has some facts, use that to build the discussion and begin the introduction of your appraisal of the maneuver, good and bad.

- Try to cover as many of the maneuvers and ground school topics [taught during this session] as possible during this question and answer process.
- Always ask the student if they have any more questions before departing.
- Discuss what you will do in the next session so the student can get mentally prepared.

As the instructor, it is a good idea to keep notes about the students we teach. Although certainly not required, it adds an air of professionalism and helps us remember the specifics from one training session to the next.

7 Summary

To my knowledge, no one has tried to compile Method of Instruction, club regulations, AMA regulations, ground school, flight instruction and a terminology dictionary in one document. To that end, I hope that the information contained herein is of some use to our flight instruction staff. The information provided is not intended to offend or suggest that one teaching method or technique is better than another. What I am trying to say is that no matter what you do; standardization helps produce a more consistent result.

The club and I appreciate you volunteering to be a Flight Instructor and understand the time and effort it takes to take on a responsibility of this type. It is the dedication of members like you that continue to make our club great!

Happy Flying,

Gary Pyles

8 Radio Control Terminology

8.1 Instructor Commands

Push, to move the right stick toward the top of the transmitter. This movement causes the elevator to deflect downward, thereby pushing the tail of the aircraft up. This stick movement will put the nose of the aircraft into a dive.

Pull, to move the right stick toward the bottom of the transmitter. This movement causes the elevator to deflect upward, thereby pushing the tail of the aircraft down. This stick movement will put the nose of the aircraft into a climb and is used when turning the aircraft.

Right, to move the right stick toward the right side of the transmitter. This movement causes the right aileron to deflect upward and the left aileron to deflect downward, thereby pushing the right wing down

and pushing the left wing up. This stick movement will cause the aircraft to enter into a right bank. A banking movement is the first step of turning an aircraft.

Left, to move the right stick toward the left side of the transmitter. This movement causes the left aileron to deflect upward and the right aileron to deflect downward, thereby pushing the left wing down and pushing the right wing up. This stick movement will cause the aircraft to enter into a left bank. A banking movement is the first step of turning an aircraft.

Increase Throttle, to move the left stick toward the top of the transmitter. This movement causes more fuel and air, or electrical power, to go to the aircraft engine, increasing propeller speed. This increase in speed will usually cause the aircraft to climb.

Reduce Throttle, to move the left stick toward the bottom of the transmitter. This movement causes less fuel and air, or electrical power, to go to the aircraft engine, decreasing propeller speed. This decrease in speed will usually cause the aircraft to descend.

Neutral Position, to release both sticks and allow them to return to their spring-loaded center position on the transmitter. Telling the student to do this is a lot like pressing the reset button on the video game. It allows them to start again from a known position for you and them.

Bump, the act of tapping the right stick, left or right, and allowing it to return to the neutral position. The bump command shall include the direction of the bump. For example, bump-right or bump-left. This stick movement imparts a momentary aileron input that allows for minor course corrections. The bump is always a small movement and allowed it to return to the neutral position. If additional course correction is required, bump again. By using the bump method, it reduces the tendency of the student to swerve back and forth across their intended course. Although typically used for aileron control, it can be used for elevator control as well. Unfortunately, the terms bump-push and bump-pull, do not roll off the tongue very well.

8.2 Types of Aircraft Models:

ARF Almost Ready to Fly. The wings and fuselage are built and covered and varying amounts of assembly are required including installation of the engine, servos, control surface linkage, landing gear, and receiver. Plan on spending about 20 hours building your first simple ARF. Almost any model can be glow/ nitro fuel or electric powered these days with little trouble.

BNF Bind and Fly, This aircraft requires very little assembly and usually comes with everything you need to fly except a transmitter, batteries and or fuel. The landing gear and wings usually require some assembly.

RTF Ready To Fly, This aircraft usually has everything required to get in the air with very little assembly required. The transmitter is included, but is generally a very basic system, allowing connection to only one aircraft.

Kit, This usually means that the box contains a plans, bunch of sticks and sheets of balsa and requires construction of the entire aircraft, as well as covering the airframe.

Foamy, An airplane whose primary construction is a type of structural foam. Usually electric powered and very durable.

8.3 Types of Fuel:

Glow/Nitro Fuel, a mixture of Alcohol, Nitromethane, and a lubricant (castor oil, synthetic oil, or a blend). This fuel is used in 2-stroke and 4-stroke Glow/Nitro engines. Fuel mixtures are available in 10%, 15% and 30%.

LiPo Lithium Polymer battery, A high capacity and high discharge capable battery used by most RC electric airplanes and helicopters to power the motor, receiver and servos. These batteries are rated at 3.7 volts per cell with a maximum charge for each cell at 4.2 volts. A LiPo is described by the number of cells or "S", total "mAh" of the pack, and the maximum discharge rate of the pack "C". For example a 3S, 2200mAh, 20C LiPo has the following characteristics; Total voltage = 3 cells x 3.7 volts = 11.1 V, 2200 milliamps of power, max discharge of 30 x 2200 mA = 66 Amps.

> ***WARNING***: Special care is required when charging and handling LiPo batteries. If a LiPo is dropped, or punctured, quickly remove the battery to a safe area that will not support a fire, like a concrete driveway. Always make sure that you use a charger designed for charging and balancing LiPo batteries

8.4 Aircraft Electrical Parts and Radios:

Battery Usually refers to the battery used in a glow/nitro aircraft to power the receiver and servos. These batteries are typically NiCd (nickel-cadmium) or NiMh (nickel-metal-hydride) but may also be LiPo.

> ***WARNING***: It is critical that the charge level of these batteries are checked after each flight. Low voltage of this battery during flight will result in the receiver losing signal and the aircraft becoming uncontrollable and probably crashing.

ESC Electronic Speed Controller, a solid state device that interprets signals from the throttle channel of the aircraft's receiver and increases or decreases the electric motor speed accordingly. This device replaces the throttle servo used in nitro aircraft. Many ESCs provide power to the aircraft receiver and servos through an integrated BEC.

BEC Battery Eliminator Circuit, this electronic device integrated into an ESC, or stand alone, provides regulated electric power to the aircraft's receiver and servos. Many of these systems allow the voltage to be adjusted between 4.8 and 7.4 volts

Transmitter, The radio that is used to communicate with your aircraft receiver. The device is characterized by the number of channels that can be controlled 4, 6, 8, etc. Most current transmitters sold operate on a frequency of 2.4GHz and do not require specialized crystals for designated frequencies. Older radios operate on FM and require dedicated crystals for each model. Additionally, FM radios may use the same transmitter/receiver channel as another transmitter. Because of this, strict rules are set forth for anyone using FM radios to prevent accidentally interfering with someone else's aircraft.

Receiver A radio component that receives signals from your transmitter and controls the movements of servos, an ESC or other device. It receives power from the receiver battery pack or BEC. Receivers are rated by the number of channels they can receive and control, i.e. 4, 5, 6, 7, 8, 9, 10, 12. Receivers must be matched to your transmitter.

Servo, A small electric motor controlled remotely to move the control surfaces, throttle, landing gear and other components.

Glow Plug A small device used in glow/nitro engines to allow continuous combustion of fuel after starting the engine. A glow plug looks like a small spark plug. A 1.5 volt electric current is sent to the glow plug by a glow driver or other electrical connection. The electricity heats a platinum wire in the center of the plug that is exposed to the atomized fuel and air mixture in the combustion chamber allowing the fuel to explode and move the piston. After starting the heat from the combustion stroke keeps the glow plug HOT and in turn allows combustion to continue.

8.5 Support Equipment: (usually in a box called the Field Box)

Glow Driver A device that contains a 1.5 volt battery, NiMh or NiCd that has a stem that connects to a glow plug during engine starting. Some kits come with their own battery and charger for the driver. Some can connect to a power panel on your field box.

Fuel Pump A device used to transfer Nitro fuel from the container to the aircraft's fuel tank. This device may be manual, using a hand-crank, or electric. An electric pump will run off of a 12V battery if you have one for your starter.

Starter Usually a 12 volt electric motor with a rubber cone mounted on the shaft, The rubber cone is placed on the aircraft's spinner to turn the spinner while starting a glow/nitro engine. The starter may be connected to any 12 volt source, or may have its own battery. Sealed 12V batteries are available to mount in your field box. You will need a charger for the 12V battery.

8.6 Aircraft Parts & Controls:

Prop Propeller, or airscrew. For most electric planes the props are plastic and specially made for electric motors and usually have an E in the prop description. For glow/nitro engines the prop may be plastic, glass fiber, wood, or carbon fiber. The prop is described by its diameter and pitch. For example a 10x 6 prop is 10 inches in diameter and the pitch of 6 will push a column of air 6 inches during one complete rotation. Always inspect props prior to flight and do not use a cracked prop.

Spinner The nose cone on the front of an airplane that is mounted to the propeller.

Fuselage The long body section of an airplane, or the body of a helicopter.

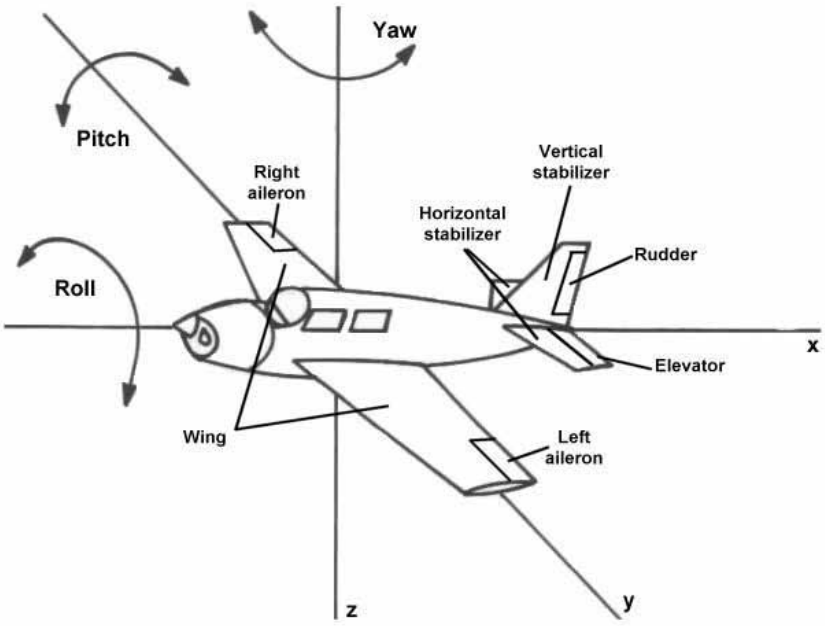
Empennage The part at the rear of an airplane that includes the horizontal and vertical fins or stabilizers. Also referred to as the "Tail Section" or "Tail Feathers". This section adds stability and control of the aircraft in the Pitch and Yaw axis.

Wing The wing is an airfoil that provides lift as a result of the difference in velocity of the wind as it passes over the top and the bottom creating a pressure differential that lifts the aircraft into the air. Wings have many shapes and designs and may have ailerons and or flaps.

Dihedral, The upward angle of the wing on a plane as measured from the fuselage to the wing tip. This adds stability to the aircraft and allows the airplane to fly level and correct itself to some extent. Think of the fuselage hanging between the wing tips.

Control Surface A part of the aircraft that is connected to the airframe and moves via a servo motor by remote control. The movement of the control surface alters the flow of air around the aircraft and therefore causes the aircraft's attitude to change around the pitch, roll and or yaw axis.

Elevator A control surface that is located on the horizontal stabilizer that controls the Pitch axis.



Pitch Axis Controlled by the elevator, pitch is the position of the nose of the aircraft relative to the horizon. If the nose is up, typically the aircraft is climbing. If it is down, it is descending. Pitch is controlled by the up and down movement of the "Right Stick" of your transmitter.

Ailerons A control surface located on each wing that controls the Roll axis.

Roll Axis Controlled by the ailerons, roll is the position of the wings of the aircraft in relation to the horizon. An aircraft rolls around the long axis of the aircraft, typically the fuselage. Roll is used to turn the aircraft left or right. Roll is controlled by the left-and-right movement of the "Right Stick" of your transmitter.

Rudder A control surface that is located on the vertical stabilizer that controls the Yaw axis.

Yaw Axis Controlled by the rudder, yaw is the alignment of the fuselage with the direction of travel of the aircraft. Simply put, the position of the nose relative to the direction of travel. Rudder is used while taxiing and to coordinate airplane turns in flight. Yaw is controlled by the left-and-right movement of the "Left Stick" of your transmitter.

Aircraft Attitude, The position of the aircraft relative to its 3-axis pitch, roll and yaw and the horizon.

CG Center of Gravity, this is the longitudinal balance point of the aircraft. Refer to the aircraft manual for the correct balance point. A CG that is not within the design limits of the aircraft can make the aircraft uncontrollable in flight and it will crash.

Covering, The most common are polyester based coverings that have a type of glue on the back that reacts to heat. Additionally, these materials shrink when heated and become very taught. The covering adds a great deal of structural strength to the aircraft. The covering is applied using a heat gun or iron. Commercial names are Monokote and Ultracote.

8.7 Other:

CA Cyanoacrylate glue or "super glue" For model building there are several types of CA. The most common is "Medium gap-filling". This glue bonds skin on contact, and many other objects, instantly. If you have an aircraft made of foam use "Foam Safe" CA as other glues may dissolve your aircraft.

Appendix A, AMA guide for Intro Pilot Selection Criteria

Academy of Model Aeronautics
5161 East Memorial Drive
Muncie, Indiana 47302
(765) 287-1256 – Business
(765) 289-4248 – Fax
(800) 435-9262 – Membership Services
http://www.modelaircraft.org

AMA Guide for Introductory Pilot Instructor Selection Criteria and Flight Proficiency Demonstration

Question: What is the most important decision any pilot can make?

Answer: When ***not*** to fly…..

Explanation: If the pilot isn't ready, if the equipment isn't ready, or if the conditions aren't right…….. *do not fly*!

These are good words to go by no matter what kind of airplanes you fly……full scale or models.

Are you an R/C instructor? How did you get the job? Were you asked by your club president? Were you the only one willing to do it? Do you like the prestige of being a club instructor? Are you the best instructor in your club?

When successfully introducing newcomers to the hobby/sport of aeromodeling or helping intermediate pilots improve their skill level there are various items that need to be considered. Choosing an effective, efficient and experienced instructor is very important.

People vary greatly on their ideas of what makes a good instructor. Some think that good instructors are born and possess a kind of charismatic presence that results in highly motivated learners. This view tends to result in instructors that are more likely to credit their own performance as the key to learning instead of the ability of the learner.

Some believe that instructional ability is something acquired, involving training, discipline, and a good deal of patience. They strive for instructional excellence, and assess their effectiveness by how well the learner performs.

Most agree, however, that good instructors share a love for instructing and learning, and that a good instructor must be a learner, and must possess strong motives and a positive attitude toward learning.

There is a tie between effective instruction and effective learning, but instructors only enhance learning. They set up a situation that provides the student with the opportunity to learn. Effective instructors are often those who look for ways of matching individual learning styles to their own instructional style.

The measurement of an instructor should not be how few hours, or how few flights it took for their student to solo, but instead, what skills, what presence of mind, and what judgment that student can demonstrate.

So what things constitute a good instructor?

Besides being a qualified pilot, there are other important attributes that need to be considered. In 1998 the AMA held three Introductory Pilot Program meetings at different trade shows. One of the main subjects discussed was the definition of a good instructor. The following lists the various traits that are important in choosing an individual:

- Good communicator
- Patience and even temperament
- Reliability
- Consistency
- Dedication
- Good teaching skills
- Good team player
- Thorough knowledge of equipment
- Thorough understanding of safety issues
- Good preflight skills
- Good piloting skills
- Ability to judge piloting skills
- Good at balanced praise and criticism

This list is not all inclusive, but it is a start.

Remember, the best pilot can be the worst instructor if he/she doesn't have good people skills! But good people skills will not do any good if the instructor is not qualified and experienced enough in flying.

To assist you in establishing your Introductory Pilot Instructor has a good level of flight proficiency, we have created a list you can use as a recommended outline. We strongly encourage that any individual who is assigned as an instructor be able to successfully perform the following flight proficiency demonstration.

For more information on the Introductor Pilot Program visit http://www.modelaircraft.org/PDF-files/917.pdf or contact Lois Mock at loism@modelaircraft.org

FLIGHT PROFICIENCY DEMONSTRATION FOR INTRODUCTORY PILOTS

1. Preflight	• Demonstrate knowledge of aircraft systems and perform preventive maintenance inspection on aircraft.	☐
2. Engine Start	• Demonstrate knowledge of ground support equipment and perform a safe engine start.	☐
3. Take-off	• Perform take-off while maintaining heading (no more than two wingspans from runway centerline)	☐
	• Perform a smooth rotation	☐
	• Perform a controlled transition to level flight at predetermined altitude and heading	☐
4. Rectangular Pattern (at altitude)	• Perform rectangular pattern while:	
	• Maintaining constant altitude	☐
	• Compensating for drift	☐
5. Climbing and Descending Turns	• Perform climbing and descending turns while:	
	• Maintaining smoothness of control	☐
	• Compensating for drift	☐
	• Controlling airspeed	☐
6. Horizontal Figure 8 (from both directions)	• Perform horizontal Figure 8 while:	
	• Maintaining constant altitude	☐
	• Compensating for drift	☐
	• Maintaining symmetrical circles	☐
7. Stall Recovery (at altitude)	• Perform power-on stall & recovery (at safe altitude)	☐
	• Perform power-off stall & recovery (at safe altitude)	☐
8. Steep Turns (bank angle greater than 50 degrees)	• Perform (3 each direction) high G-turns while:	
	• Maintaining constant altitude	☐
	Compensating for drift	☐

9.	**Loops**	• Perform 3 consecutive loops while: • Maintaining heading ☐ • Compensating for drift ☐ • Maintaining symmetrical circles ☐
10.	**Missed Approaches**	• Perform (3 missed) approaches while: • Maintaining directional control of aircraft at low airspeed ☐ • Transitioning to flight configuration ☐
11.	**Touch & Goes**	• Perform 3 touch & goes in both left and right hand pattern (6 total) while: • Maintaining heading (no more than two wingspans from centerline) ☐ • Landing within a 10-meter long predetermined touch down zone ☐ • Transitioning smoothly to take-off configuration ☐
12.	**Full Stop Landing**	• Perform full stop landing while: • Maintaining airspeed control ☐ • Maintaining heading (no more than two wingspans from centerline) ☐ • Landing within a 10-meter long predetermined touch down zone ☐ • Maintaining centerline heading during roll-out ☐
13.	**Simulated Deadstick Landing**	• Perform simulated deadstick landing—when called for by Contest Director (power stays at idle during maneuver) • Maintaining airspeed control ☐ • Maintaining heading (no more than two wingspans from centerline) ☐ • Maintaining centerline heading during roll-out ☐

Appendix B, Flying at AMA Chartered Club Sites

Academy of Model Aeronautics
5161 E. Memorial Drive, Muncie IN 47302 • loism@modelaircraft.org
(765) 287-1256 • Fax (765) 286-3303

Flying At AMA Chartered Club Sites

The continuing growth of model aviation has generated an increasing number of inquiries regarding AMA's policy as it pertains to usage of flying sites by chartered clubs, their guests, and others. While it is not possible to state a policy that addresses every scenario imaginable, AMA has, for several decades, stressed to clubs the importance of conducting flying site activities in a manner that minimizes the risk of an accident which might result in "uncovered" liability to an AMA club, member and/or site owner.

AMA members and clubs pool their resources in order to obtain insurance for themselves and their flying site owners at very low rates. This is a key point to keep in mind when considering the use of club flying sites by non-AMA members. If a flying site owner relies on your insurance for an accident caused on its property by a non-AMA member, your money is being spent to finance the activities of someone who paid nothing for that benefit.

To preserve the availability of low cost insurance to your club and its site owner, the people who fly with your club should contribute their share of that cost. They can do so by becoming dues paying members of your AMA charter club as well. In the same vein, if the landowner for your club's chartered club field has granted the club exclusive flying privileges, the club should ONLY allow AMA members and current members of the Model Aeronautics Association of Canada (MAAC) to fly at the field. If your club is flying on public land and it has not been granted exclusive flying rights by the public agency in charge, your club activities should be confined to AMA members, and you are not responsible for other (non-AMA) flier's actions. Should the public agency be named as an additional insured, it has coverage only for the actions of your club, its members, and other visiting AMA members who are considered guests.

For non-AMA members wishing to experience a "hands-on" model flight, the Academy does allow this, on a one-time basis per person ONLY, (with the use of a Buddy Box system for RC). During this one-time flight, the club is protected through its liability coverage as long as the non-member's supervised flying is in accordance with the AMA National Model Aircraft Safety Code(s). Under NO situation should the non-member's equipment or aircraft be used.

ONLY AMA members are insured during this flight per the terms of the liability policy. This coverage is never transferable to the non-AMA member during the permitted one-time trial flight.

Should an accident occur during this one-time flight, the person providing the flight assistance must file an accident report. Under the liability policy, the airplane is never insured and the non-AMA member is never insured during this flight.

Can someone be insured during training at a chartered club field and not be a regular AMA member?

Under the AMA Introductory Pilot Program, a non-AMA person may receive lessons during a 60-consecutive-day period under the direction of a designated AMA Instructor. The program information has been mailed to each chartered club. During supervised flight instruction, liability insurance is provided for the trainee for a 60-day period but only at the club site. Though the trainee will not receive a membership card, he/she is considered a member of the Academy while under the direct supervision of the currently registered designated Introductory Pilot. Introductory Pilots are charged with the responsibility to ensure that the trainees' activities will be conducted in compliance with the AMA's National Safety Code(s). Coverage under the Intro Pilot Program begins the day recorded on the Trainee Pilot Registration Form. To take advantage of the full 60 days of liability insurance, register the trainee after the non-flying instructional session(s) and prior to their first flying exercise at the club field.

Signing up Intro Pilots and trainees can be done at anytime on our Web site at www.modelaircraft.org/MembersOnly/intropilotdesc.aspx. Forms are also available for download at www.modelaircraft.org/PDF-files/917.pdf.

The Academy appreciates your interest and promotion of the sport of modeling through implementation of training programs. If this document does not answer your questions regarding club insurance, guests, or trainee flying, call the Club Secretary at (765) 287-1256, extension 291, or correspond directly.

Appendix C, Buddy-Box Setup JR 9303

TRAINER – TRAINER SYSTEM

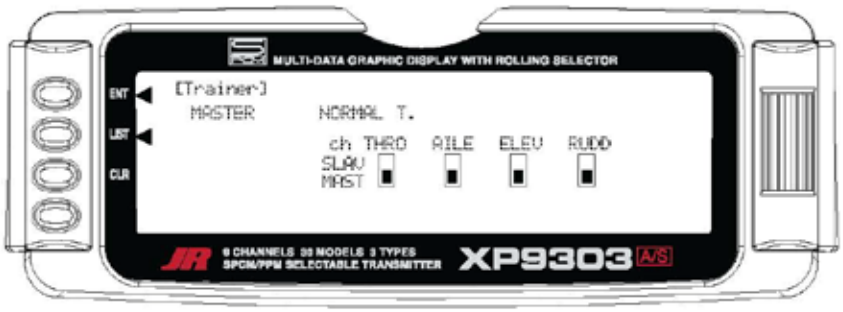
The XP9303 contains a Trainer System that allows the instructor to transfer some or all of the primary flight control functions (Throttle, Aileron, Elevator and Rudder) to the student. It also allows for indicating if the transmitter (TX) is to be the Master (controlled by the instructor) or Slave (controlled by the student). The Snap Roll button is used to transfer control to the student when the XP9303 is being used as the Master/Instructor transmitter.

All Dual rates and Exponential settings in the Master TX are transferred to the Slave TX. The Slave TX battery must be charged.

1. Connect the Trainer cord between the Master and Slave transmitters. Turn the power on to the Master transmitter (the Slave TX remains powered off and can even have the module removed).
2. Make sure the Slave TX is in the PPM/FM modulation mode. See ***MODULAT*** in the ***SYSTEM Menu*** if the Slave TX is a XP9303 or refer to the owners manual if the TX is not a XP9303.
3. Highlight and select ***Trainer*** in the ***FUNC.LIST*** to obtain the Trainer Display.

XP9303 USED AS MASTER (INSTRUCTOR) – (Trainer System)

1. If the XP9303 is being used as the Master TX (the TX operated by the instructor), select the channel(s) that are to be operated by the Slave TX (TX operated by the student) when the trainer switch is depressed.



When all channel selectors are in the MAST position, ***NORMAL*** appears on the display and all 4 channels are transferred to the student when the trainer switch is depressed.

If only certain channels are to be transferred to the student, highlight and select the channels that are to be transferred, moving the indicator for these channels to the SLAV position for these channels. When less than all channels are selected as SLAV, ***PROGRAM T*** appears on the display indicating that the Trainer System has been programmed to transfer only selected channels.

The XP9303 is now ready to be used as the Master or instructor TX. Depress the Snap Roll button to transfer control to the student. Control will remain transferred until the Snap Roll button is released.

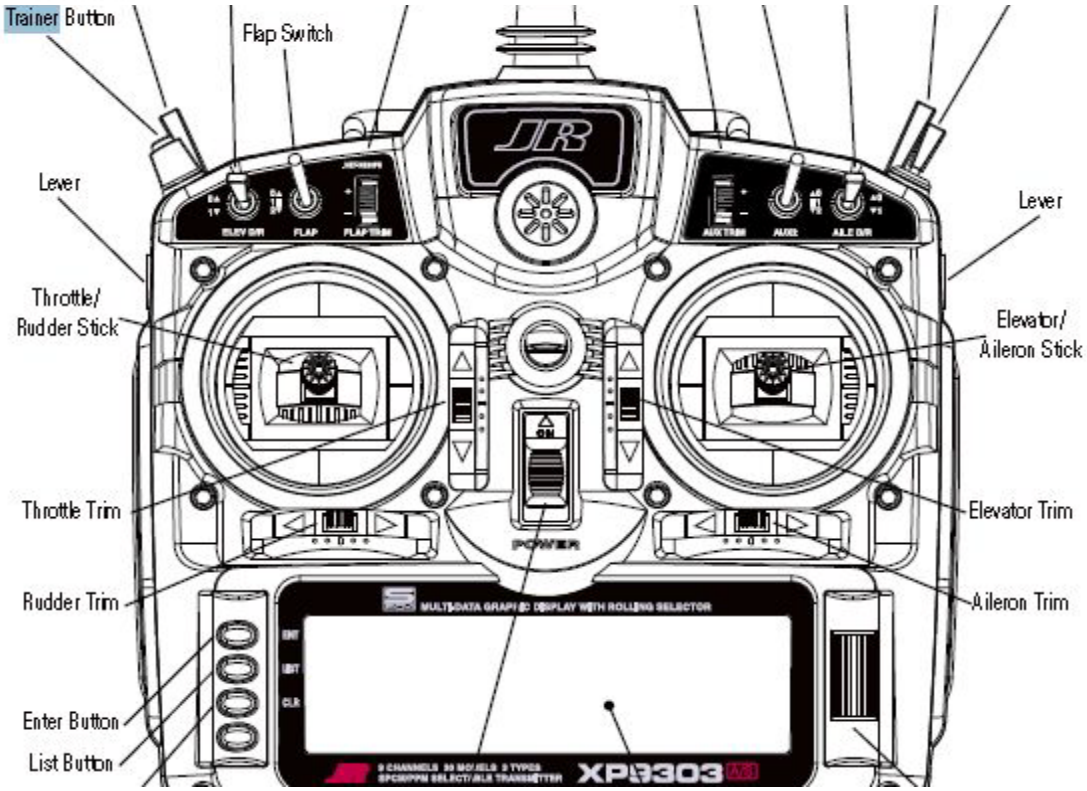
JR 9303, continued

XP9303 USED AS SLAVE (STUDENT) – (Trainer System)

1. If the XP9303 is to be used as the Slave TX (TX used by the student), be sure that the currently selected model is set to PPM Modulation (see ***MODULAT*** in the ***SYSTEM Menu*** if the Slave TX is a XP9303).

2. Highlight and select ***MASTER*** and the display will switch to ***SLAVE***. A message will appear instructing to ***Connect DSC & POWER off***. Make sure the TX power switch is in the Off position and the DSC cord is connected between the 2 transmitters.

The XP9303 is now ready to be used as the Slave or student TX.



Appendix D, Buddy-Box Setup Futaba 8FG

TRAINER

Trainer system starting and setting

The Trainer function makes it possible for the instructor to choose which functions(*1) and channels are to be used for instruction, making it possible to match the training ability to the student's skill level. Two transmitters must be connected by an optional trainer cord, and the instructor's transmitter should be programmed for trainer operation, as described below.

When the Instructor activates the trainer switch, the student has control of the aircraft (if MIX or FUNC mode is turned on, the Instructor can make corrections while the student has control). When the switch is released the Instructor regains control. This is very useful if the student gets the aircraft into an undesirable situation.

You can select the channel input data from the student transmitter as either "FUNC" or "MIX" mode. These options make it easier to use a variety of receivers, transmitters, etc.

It is also possible to use the virtual channel (VC) at "FUNC" or "MIX" mode or to use the trainer system with flying wing airplanes.

When using T8FG as the student transmitter, the trainer function is not used.

(*1) You can select the operation mode for each channel. (NORM/MIX/FUNC/OFF)

NOTE: This trainer system can be used in the following manner;

1. **With the T8FG transmitter and a conventional transmitter, if the channel order is different, it is necessary to match the channel order before using this function.**
   You can select the channel of input data from student's transmitter in the "FUNC" or "MIX" mode.
2. **When the T8FG is used as the instructor's transmitter, set the modulation mode of the student's transmitter to PPM.**
   If being used as the student, T8FG can be connected to the instructor's transmitter which the PPM mode as the student's modulation mode is required. T8FG always sends PPM mode signal from the trainer jack.
3. **Be sure that all channels work correctly in both transmitters before flying.**

T8FG/T12FG special trainer cable

Use the T8FG/T12FG special trainer cable (FUTM4405) when using the T8FG or T12FG transmitter at the trainer function instructor side. Operation may not be normal with a conventional trainer cable.

*If the T8FG or T12FG transmitter is used as the student transmitter when the instructor transmitter is not a T8FG or T12FG, a conventional trainer cable may be used.

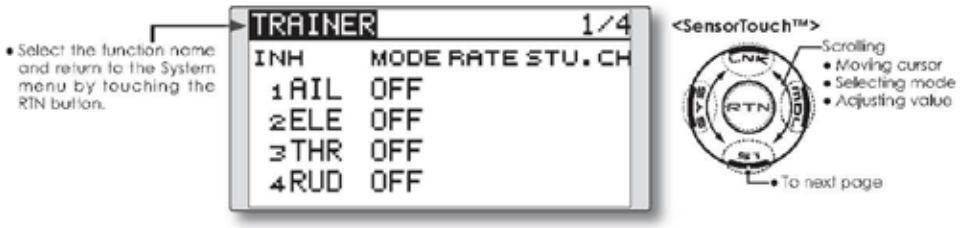
Instructor	Student	Trainer cable
T8FG, T12FG	T4EX, T6EX, T7C, T9C	T12FG special trainer cable
	T12Z, T14MZ, FX-40	Conventional trainer cable (Rect. - Rect.)
	T4V	Conventional trainer cable (Rect. - Round)
	T6X, T7U, T8U, and T9Z are not applicable.	
Other than T8FG, T12FG	T8FG, T12FG	Conventional trainer cable (Rect. - Rect.) or Conventional trainer cable (Rect. - Round)

*The direction that the T8FG/T12FG special trainer cable connects is fixed. Connect the instructor cable adapter connector of the cable to the instructor T8FG or T12FG and connect the student connector to the student transmitter. If the cable is connected in reverse, the student's transmitter power will not be turned on even if the instructor side power is set to ON.

*If the instructor side T8FG or T12FG trainer function is not enabled, the student's power will not be turned ON even if the connection direction is correct.

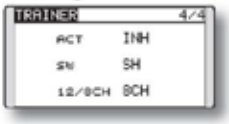
Futaba 8 FG, continued

• Select [TRAINER] in the System menu and enter the setup screen shown below by touching the RTN button.



Mode and switch selection

1. Access the setup screen page 4 shown below by touching the S1 button three times.



2. Move the cursor to the [ACT] or [12/8CH] item and touch the RTN button to switch to the data input mode.
3. Select the mode by scrolling the touch sensor. The display blinks. Touch the RTN button to change the mode. (To terminate the mode change, touch the S1 button.)

"ACT": Enable operation by changing to [OFF] or [ON].

"12/8 CH": When the student uses the T14MZ, T12Z, T12FG or FX-40, select [12CH]. Otherwise select [8CH].

If changing the trainer switch:

4. Move the cursor to the [SW] item and touch the RTN button to access the switch setup screen.

(See "Switch selection method" at the end of this manual for selection method details.)

"SW": Select the desired switch.

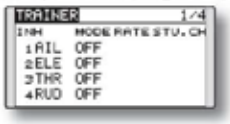
Initial setting: SH

*The switch mode can also be selected when setting the ON position on the switch setup screen. When [ALTERNATE OFF] is selected, normal ON/OFF operation is performed. When [ALTERNATE ON] is selected, the trainer function is alternately turned on and off each time the switch is operated. This allows alternate ON/OFF switching even when a momentary switch (SH) is used.

Note: The trainer function won't be turned on unless the instructor's transmitter receives signals from the student's transmitter. Be sure to confirm this after connecting your trainer cable.

Operating mode selection

(Setup screen page 1-3)



1. Move the cursor to the [MODE] item of the channel you want to change and touch the RTN button to switch to the data input mode.
2. Select the mode by scrolling the touch sensor. The display blinks. Touch the RTN button to change the mode. (To terminate the mode change, touch the S1 button.)

"MODE": Select the desired operation mode for each channel.

NORM: The model is controlled by signals from the student transmitter.

MIX mode: The model is controlled by signals from the instructor and student transmitters. (Reset the student's model data to the default condition.)

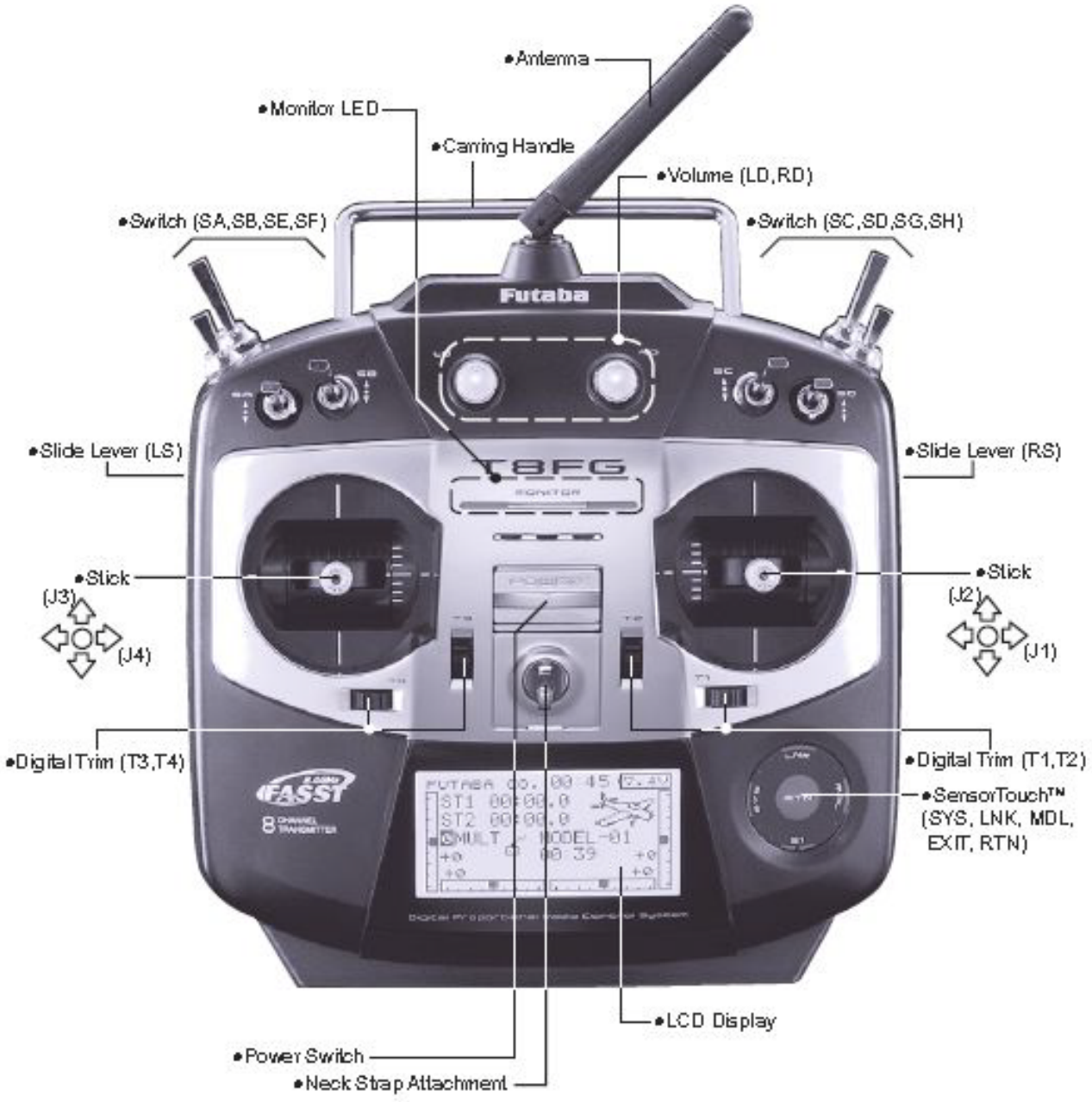
FUNC mode (function mode): The model is controlled by signals from the student transmitter with the instructor 's setting. (Reset the student's model data to the default condition.)

OFF: Only the instructor side operates.

Adjusting the student's rate.

*The setting above allows setting of the servo throw relative to the amount of student side operation when [MIX] or [FUNC] was selected.

Futaba 8 FG, continued

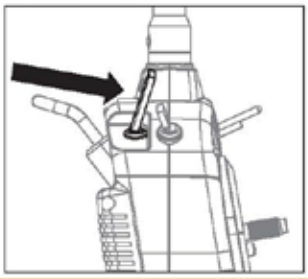


Appendix E, Buddy-Box Setup Spektrum DX6i

MASTER/SLAVE INFORMATION

To operate the DX6i as a master:

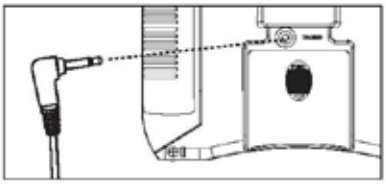
- Transmitter batteries fully charged.
- Bind the transmitter to the model.
- Connect the trainer cord (SPM6805) to the back of the transmitter.
- Make sure the slave transmitter batteries are fully charged.
- Make sure the slave transmitter is powered off; the slave transmitter receives power when you connect the trainer cord. At this point, the slave will not transmit a signal to the model.
- Move and hold the master transmitter's trainer switch to give model control to a slave transmitter.
- The trainer switch is on the back left of the transmitter (Mode 2, used in USA or on the right side on Mode 1 transmitters).
- Release the trainer switch to give model control to the master transmitter.

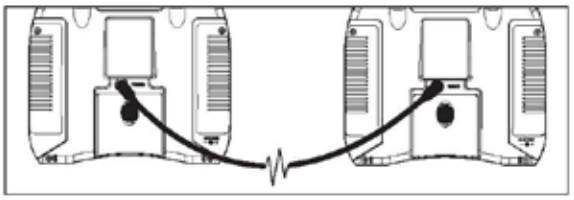


To operate the DX6i as a slave:

- Make sure transmitter batteries are fully charged.
- Make sure transmitter is powered off
- Connect the trainer cord between the master and slave transmitters.
- The DX6i screen will show information, but the transmitter will not send a signal to the model.
- Both transmitters must be programmed to control the model.

NOTICE: You must set up a model the same in both transmitters before using the trainer cord. The trainer cord does not copy model control values from one transmitter to another.





18 SPEKTRUM DX6i • RADIO INSTRUCTION MANUAL

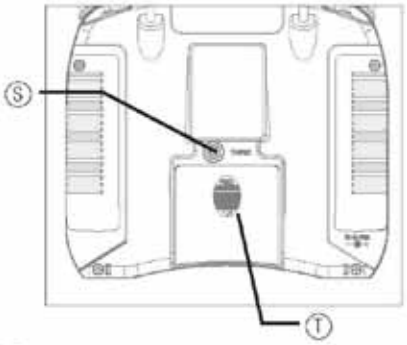
DX6i, continued

EN

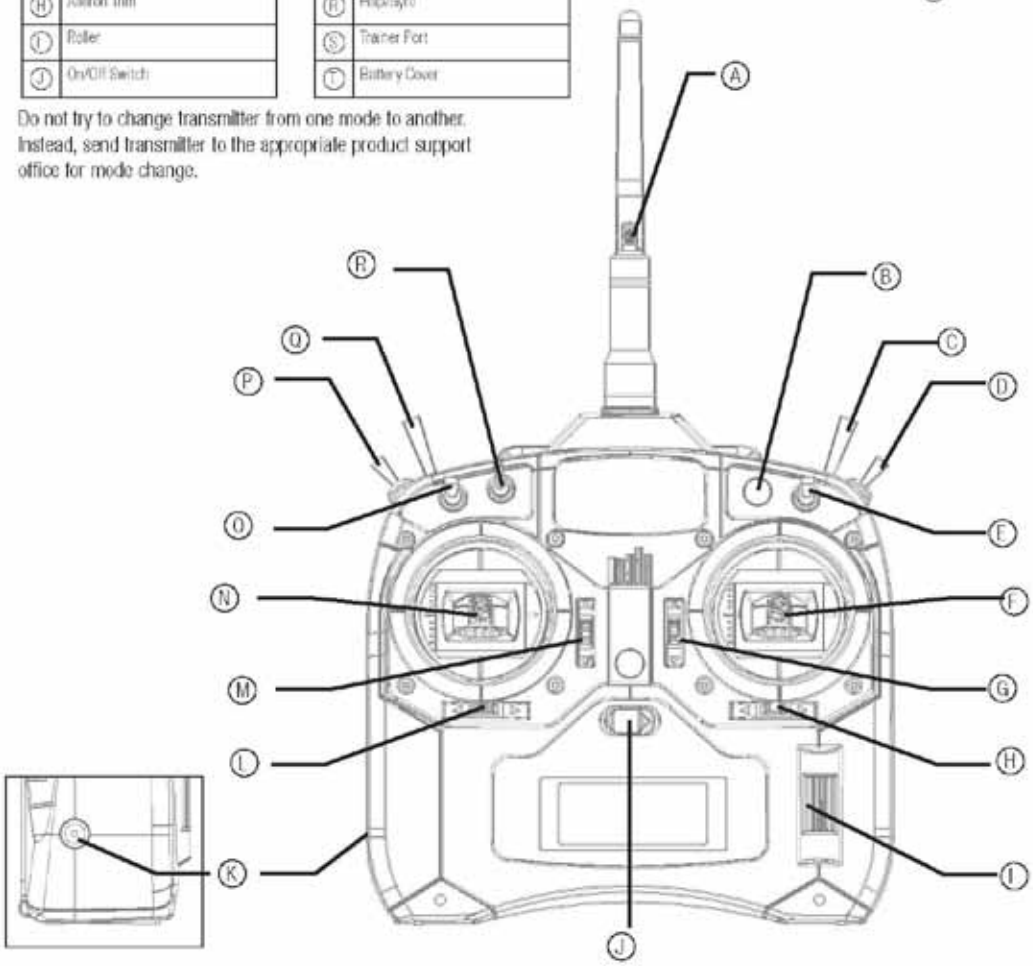
TRANSMITTER FUNCTIONS

	Function
A	Antenna
B	Throttle Cut
C	Mix/Throttle Hold *(Mode 2)* Trainer/Bind *(Mode 1)*
D	Rudder Dual Rate *(Mode 2)* Gear/Flight Mode *(Mode 1)*
E	Aileron Dual Rate
F	Aileron/Elevator Stick *(Mode 2)* Aileron/Throttle Stick *(Mode 1)*
G	Elevator Trim *(Mode 2)* Throttle Trim *(Mode 1)*
H	Aileron Trim
I	Roller
J	On/Off Switch

	Function
K	Charge Port
L	Rudder Trim
M	Throttle Trim *(Mode 2)* Elevator Trim *(Mode 1)*
N	Throttle/Rudder Stick *(Mode 2)* Elevator/Rudder Stick *(Mode 1)*
O	Elevator Dual Rate
P	Gear/Flight Mode *(Mode 2)* Rudder Dual Rate *(Mode 1)*
Q	Trainer/Bind *(Mode 2)* Mix/Throttle Hold *(Mode 1)*
R	Flap/Gyro
S	Trainer Port
T	Battery Cover



Do not try to change transmitter from one mode to another. Instead, send transmitter to the appropriate product support office for mode change.



Note: The transmitter comes with a thin clear plastic film applied to some front panels for protection during shipping. Humidity and use may cause this film to come off. Carefully remove this film as desired.

Appendix F, Buddy-Box Setup Spektrum DX7

Trainer

The DX7 offers a programmable Trainer function that allows the transmitter to operate in three different Trainer modes. Either the left or right rocker can be programmed as the trainer switch.

NORMAL:
The transmitter can be used as a master or slave but the slave transmitter must have the same programming (e.g., reverse, travel adjust, dual rates, mixes, sub trims, etc.) as the master.

P-LINK:
In Pilot Link the master transmitter maintains control of all secondary functions (e.g., dual rate, expo, gear, flaps, etc.) and only the primary stick controls (aileron, elevator, rudder and throttle) are transferred to the slave transmitter when the trainer switch is pressed.

SLAVE/P-LINK:
In the Slave mode, the DX7 is used as a slave radio in conjunction with a Spektrum radio that is used as the master that is in P-LINK mode; there is no need to match the slave's programming to the master transmitter's programming in this mode.

To Enter the Trainer Mode

Press the ***DOWN*** and ***SELECT*** keys simultaneously then turn on the transmitter.

Press the ***UP*** key until **TRAINER** function appears on screen.

Press the ***INCREASE*** or ***DECREASE*** key to select the desired Trainer type: **INH**, **NORMAL**, **P-LINK** or **SLAVE/P-LINK**.

Also note that the trainer switch can be located on the right or left rocker switch. Use the ***SELECT*** key to highlight **SW:R** then press the ***INCREASE*** or ***DECREASE*** key to select the **RIGHT** (R) or **LEFT** (L) rocker.

DX7, continued

Operating the trainer System

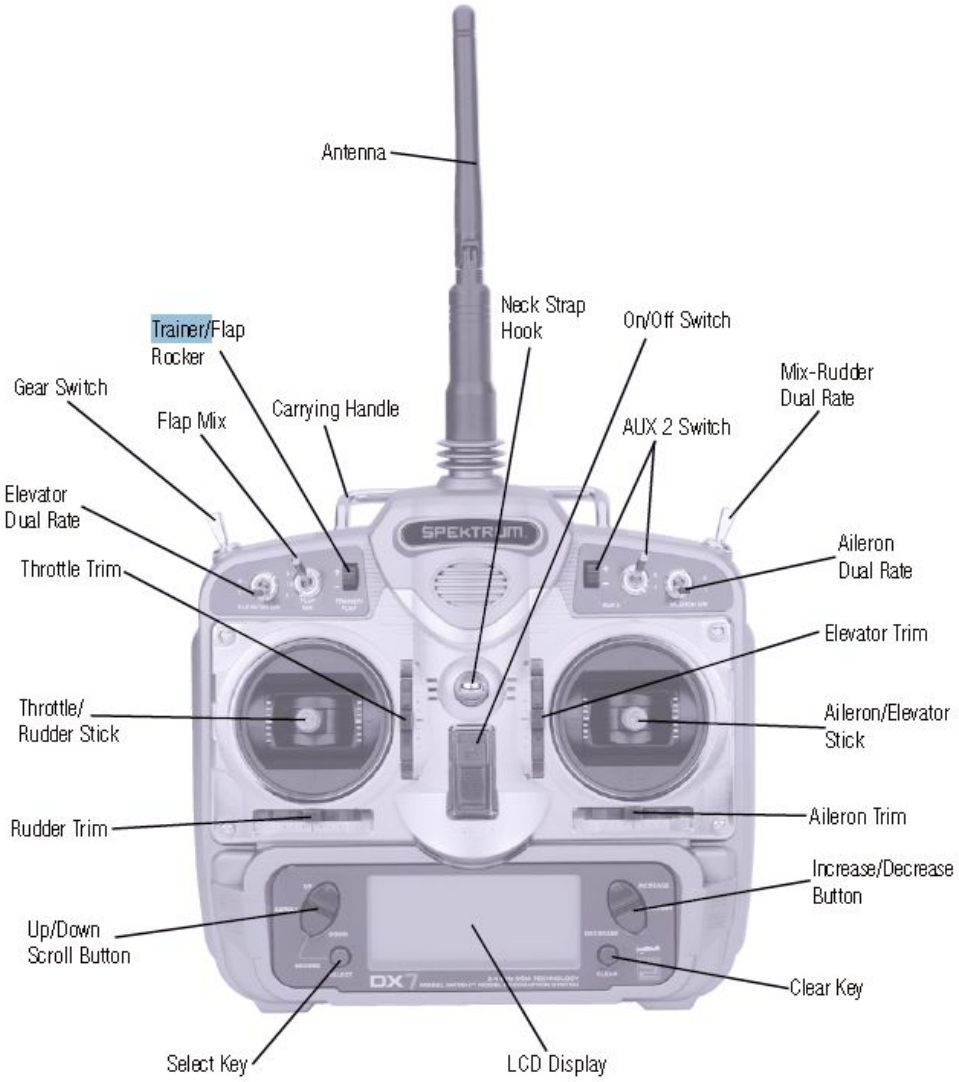
1. Select the appropriate trainer type as described above and match the servo reversing and trim on both radios if the normal trainer type is used.

2. Plug in the optional trainer cord in both transmitters.

3. Turn on the master transmitter only. The slave transmitter must have the power switch remain off.

4. Activate the trainer switch on the master transmitter and test all control functions (e.g., servo reverse, travel etc.) to make sure they are working properly using the slave transmitter.

Note: If using a JR 72MHz slave transmitter it is necessary that the slave be placed in PPM modulation.



Appendix G, Buddy-Box Setup Spektrum DX8

TRAINER

The DX8 features a programmable trainer function with three trainer modes. The transmitter assigns the trainer function to the trainer button. The function activates when the switch is depressed and one of the three trainer modes is selected. The three trainer Modes include:

Inhibit

In Inhibit you can use the transmitter as a slave only. However, the slave transmitter must have the same programming as the master (e.g., servo reversing, travel adjust, sub-trim, trims).

Programmable Master

With Programmable Master you can program the transmitter to transfer any or all channels when you activate the trainer switch. This is ideal for beginners so the student learns control of individual channels (aileron only for example) while the trainer maintains control of all other channels.

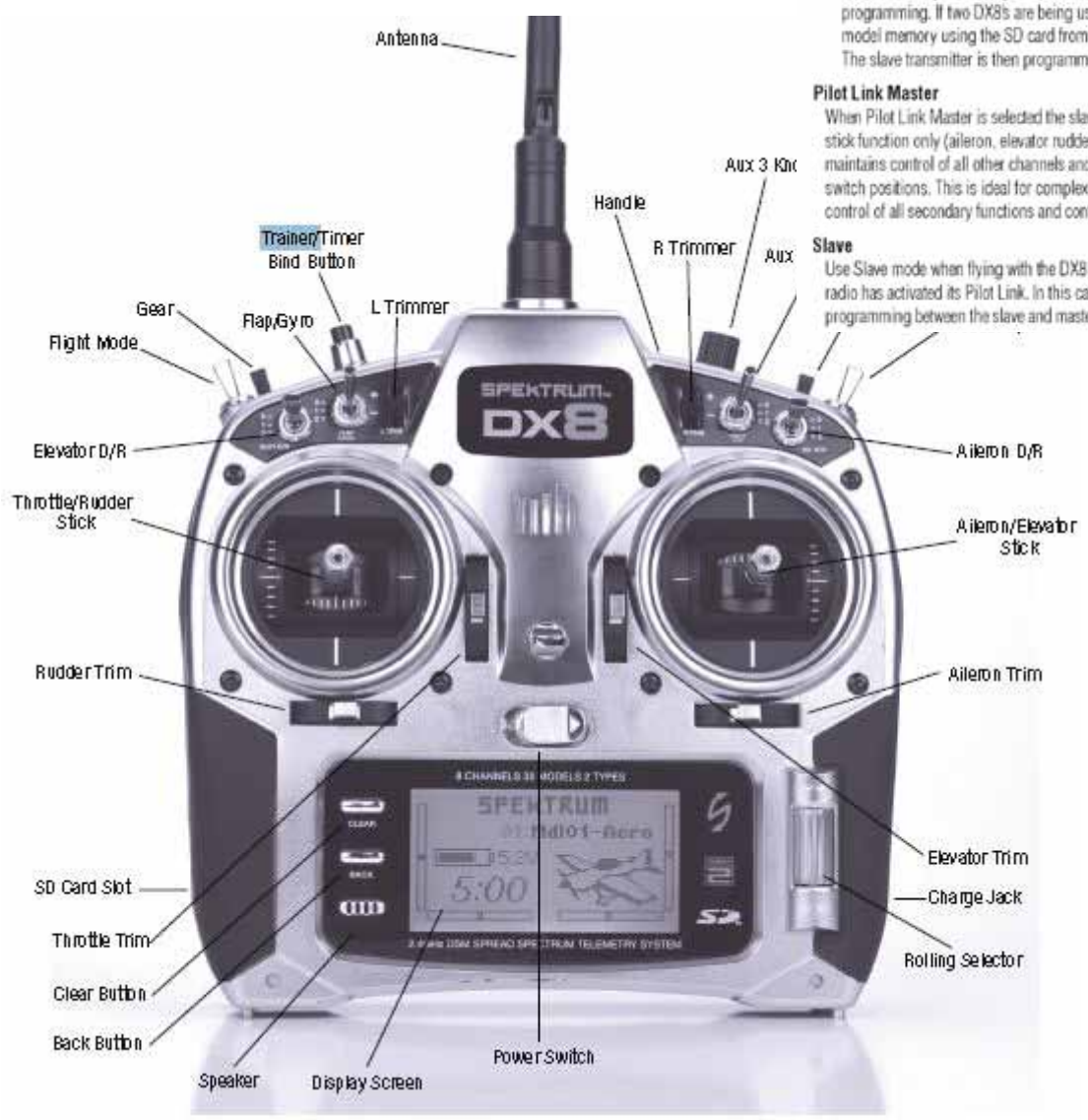
Note: When Programmable Master is selected for the master transmitter, all settings for the slave transmitter (i.e. Servo reversing, wing type, Sub trim, Travel Adjust, Mixing, etc.) must match the master's transmitter programming. If two DX8's are being used simply copy and transfer the model memory using the SD card from the master's model to the slave. The slave transmitter is then programmed to inhibit in the trainer screen.

Pilot Link Master

When Pilot Link Master is selected the slave transmitter has control of the stick function only (aileron, elevator rudder and throttle) while the master maintains control of all other channels and functions including D/R and switch positions. This is ideal for complex models as the master maintains control of all secondary functions and controls all other channels.

Slave

Use Slave mode when flying with the DX8 as a slave when the master radio has activated its Pilot Link. In this case, there is no need to match programming between the slave and master transmitter.



Buddy-Boxing with Spektrum DX8, 2.4 GHz radios

I just finished testing a Spektrum DX8 (Master) with a Futaba (slave) buddy box.

Items used for test:

1. Spektrum DX8 2.4 GHz transmitter (Master)
2. Spektrum AR6200 DSM2, 6-channel receiver
3. JR DS821 servo
4. Hydrimax, 6v, 2000 mAh battery
5. Hangar 9, "Trainer Link" (JR to Futaba (round pin)/JR) trainer cord from Horizon Hobby. Part No. HAN173
6. Futaba Skysport 4, 72 MHz, Ch 38, transmitter (Slave)

The results were good. I only adjusted 1 click of trim on the servo I was testing then there was no shift between neutral and full stick deflection between the Master and Slave.

Below is the setup process that I used. This same process should work on a DX8 to JR as well. I will test and get back to you.

1. Setup the DX8 in Trainer Mode
    a. Program your radio for your aircraft and bind as you normally would.
    b. Make sure that the model you want to setup the buddy box on is the current model selected on the radio.
    c. Turn Off the DX8
    d. While holding down the rolling selector, turn the power ON, This enters the "System Setup" where you change many aircraft and switch options.
    e. Scroll down to "Trainer" with the rolling selector (it is the third from the bottom of the list)
    f. Press the Rolling Selector to enter the Trainer Menu
    g. Roll the Rolling Selector ONE Click to the right , this should put a box around the word "Inhibit". If it does not move the rolling selector until there is a box around the word "INHIBIT"
    h. Click the Rolling Selector once, do not roll it while clicking, The box around the word "Inhibit" should be blinking. If not start over.
    i. Roll the Rolling Selector 2-Clicks to the right, the words "Pilot Link Master" should be inside the blinking box. If not roll the rolling selector until it is
    j. Click the Rolling Selector, the box should stop blinking.

k. Press the "Back" button twice and the DX8 should reboot and show you model name on the main page and the words "NO SLAVE" at the top of the page. If your radio has this message then it is ready to connect to almost any buddy box.

    i. Remember you must still set trims and servo reversing. In some cases servo travel may need to be adjusted in the buddy box, if available.

    ii. Always double-check control movement directions and deflections of the MAster and Slave prior to flight.

2. Connect a Buddy Box, FUTABA Skysport 4, 72 MHz

    a. The DX8 is on and the correct model is selected.

    b. The DX8 says "NO SLAVE" on the main page

    c. Plug in the HAN173, Trainer cord into the DX8

    d. Plug the round end of the HAN173 into the FUTABA Skysport 4

        i. You will notice that the DX8 still says "NO SLAVE" on the main page.

        ii. Turn the POWER ON, on the FUTABA Skysport.

        iii. Immediately the DX* main Page will display the word "MASTER" at the top.

        iv. The radios are now buddy-boxed, set reversing switches, travels and trims on the buddy box as needed.

        v. Remember to turn OFF the buddy box when done.

One concern I have with this process is that the FUTABA, buddy-box needs the power turned on. I think this is because a FUTABA to FUTABA buddy-box setup power is supplied to the slave from the master. Since JR/Spektrum radios do not supply power through the buddy-box cable the power must be on. I do not know if a Slave that still has its crystals will transmit when a buddy-box cable is connected. To test this I would need to have someone's 72 MHz aircraft on the same channel as a buddy box and check for interference on the ground.

This should be the same procedure for a Spektrum to JR/Spektrum buddy-box, without turning on the buddy-box power. Still need to test. I do not have a 72 MHz JR or Spektrum available for testing right now.

Appendix H, Intro Flight Organization Checklist

This document is provided to assist you in organizing the assets and activities required for a large intro flight event such as open house.

1. **Required Paperwork** (ensure you have enough paperwork for all newcomers and a few extras)
    a. Newcomer Packet, The following documents should be printed and inserted into the " How to Get Started with Radio Control Aircraft", handout.
        i. Suggested aircraft and support equipment for Newcomers
        ii. Newcomer printed packet (documents included in packet)
            1. A copy of the AMA National Model Aircraft Safety Code, required by AMA
            2. A copy of page 1, AMA document number 917, AMA Introductory Pilot Program, required by AMA.
            3. Spirits' Safety Briefing
            4. Spirits' ground school for Intro Flights
            5. Student Flight Log
        iii. Individual documents to printed and inserted
            1. Student Pilot Registration Form #2 *(To be completed by the Newcomer and Introductory Pilot Instructor and filed as required by the AMA and Spirits Flight Training Program.)* required by AMA
            2. An AMA membership application for the current year, Form #902
            3. Spirits' tri–fold brochure (with Spirits' membership application)
2. **Personnel**
    a. Introductory Pilot Instructor
        i. During events like Open House there should be a minimum of 4.
    b. Spirits Members
        i. 1 member to complete paperwork with the newcomers.
        ii. 1 flight instructor to conduct the safety briefing and teach ground school.
        iii. Additional members as needed to assist flight instructors with buddy box trimming and newcomer control.
2. **Equipment**
    a. Aircraft, during events like open house there should be a minimum of 4.
        i. All aircraft shall be run up and test flown prior to newcomers arriving.

ii. Check aircraft receiver batteries for proper charge level. Have the following spare parts available; battery, glow plug, and propeller.

b. **Transmitter**

i. Batteries charged in all master transmitters and JR slave transmitters.

ii. Correct buddy box cables available.

iii. Buddy box double checked to work properly with master transmitter.