

# 10X

USER MANUAL

AIRPLANE  
VERSION



# JR

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# Table of Contents

## Using This Manual

Refer to the Table of Contents below to find where to look for answers to your particular questions. The features are discussed in the same order as they appear on the LCD screen (numerically). An explanation of the use and purpose of each feature is provided, followed by a labeled illustration of its LCD display. Additionally, a step-by-step example is included to clarify the set-up procedure for each feature.

You will find data sheets at the end of this manual. Once you have entered all data for a particular model, we recommend that you also record it on a copy of the data sheet. If you should experience a memory battery failure or wish to make changes to the current settings, this extra step will save you a lot of time.

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# 1

## Features

### 1.1

#### Transmitter

- Up to 5 available flight modes are selectable via a programmable switch location. Each flight mode allows the adjustment and selection of nearly every parameter to alter the characteristics of the airplane for differing flight regimes (e.g., landing, aerobatics, 3D aerobatics, takeoff, etc.). Code 17.
- Digital trims on aileron, elevator and rudder feature adjustable trim rates, allowing the increments of each trim step to be adjusted to the desired amount. When adjusting the digital trims, a tone is emitted that signals each trim step. The pitch of the tone changes based on trim position (left trim – high pitch, right trim – low pitch) so that the approximate trim position can be audibly known without having to look at the transmitter.
- Digital trim positions are automatically displayed on the Info screen. A bar graph or a digital value can be selected to display the trim position.
- Digital trim positions are automatically stored in memory and recalled when switching from model to model.
- A mechanical trimmer is included on throttle, offering the ease and convenience of a visual reference during engine startup. The throttle trim rate is adjustable in Code 83.
- Two trim options are available when flight modes are activated. One allows each of the 5 available flight modes to have their own separate digital trim settings that are adjustable via the digital trim switches in each flight mode (FM trim ACT). In the other type of available trim (FM trim INH), the digital trim settings retain the same value for all flight modes and can be adjusted while in any flight mode. Code 17
- Two programmable throttle curves are available, and up to 8 points can be stored and manipulated in each throttle curve. Either throttle curve can be selected in any of the available flight modes or selected by one of several switches. Code 18
- An alarm will sound if the transmitter is turned on and the flight mode switch is not in the 0 position, warning that a possible unsafe condition exists for startup and takeoff.
- Dual rates and expo rates are independently adjustable in each direction. 5 rates and expo values are available through flight modes.
- A DataSafe™ is included (complete systems only) that allows the 10X to download model memory to any Windows 95® and later PC for infinite model storage and security. See the enclosed Data-Safe manual for instructions.
- A removable 1100mAh Sanyo® battery pack gives nearly 5 hours of continuous use. A built-in charge receptacle allows the battery to be charged separately or in the transmitter.
- Channels 5, 6, 7, 8, 9 and 10 can be activated or inhibited, allowing these channels to be used as slave channels during mixing and making it so the primary control knob/lever or switch will have no effect. Code 17.
- A dual elevator feature is pre-programmed in Code 22 and is used on aircraft that have one (or more) servos driving each elevator half. The Snap Roll function properly affects both elevators in this mode. Code 22.
- Five different rates can be programmed for the elevator, aileron and rudder, and any combination of these rates can be selected in any of the five available flight modes. Code 23.
- Five differing response curves (e.g., expo, VTR, expo/linear, etc.) can be programmed for the aileron, elevator and rudder, and any combination of these response curves can be selected in any of the five available flight modes.
- Servo speed for all 10 channels is independently selectable in each of the five flight modes. Code 24.
- Snap roll rate and direction can automatically be selected in each of the five flight modes. Code 31.
- A gyro sensor adjustment provides easy gain adjustments of any remotely adjustable gyro (JR's NEJ900 and NEJ3000). Three gain rates are programmable and can be automatically selected in each of the five flight modes. In addition, stick priority mixing (especially useful in aerobatic aircraft) can be easily selected and the center point and end point gains can be adjusted and are displayed in this screen. Code 44.
- Eight programmable mixes are available; three of which are multi-point programmable mixes. Each mix has two available mix values that can be selected in any of the five available flight modes, or by a selected switch. Code 51 through 58.
- An aileron-to-rudder mix features two mix values that can be selected in any of the five flight modes or by a selected switch. Code 62.
- Rudder-to-aileron and rudder-to-elevator mixing features two mix values each can be selected in any of five flight modes or by a selected switch. Code 64.
- Three-position flaps are available in Code 66 that allow the pre-set position for normal, mid and land flap positions, as well as elevator compensation positions. Flap position can be selected in each of the five flight modes or by the flap switch. Code 66.
- A servo monitor visually displays each of the ten servo positions. This handy feature is especially useful during the setup of mixes. Code 75.
- A pilot link is provided that allows any other JR radio to be linked via a trainer cord and allows the other transmitter to have control of the primary controls (aileron, elevator, rudder, and throttle) when the snap roll button is depressed, but allows all secondary features (e.g., flaps, flight modes, gear, etc.) to be controlled by the master transmitter.
- Touch-screen contrast can be easily adjusted by pressing the + or - key in the lower right-hand corner of the screen indicator with + LCD CONT.

## 1.2

### Receiver

- The NER 950S receiver is a high performance PCM single conversion receiver with 10 kHz super narrow band ABC&W circuitry, offering an unparalleled RF link.
- The latest “S” type Central Processing Unit (CPU) is used in the PCM receiver. It has the highest degree of resistance to electro-mechanical “noise.”
- A narrow band ceramic filter for high signal selectivity also assists in rejecting cross modulation from other common radio frequency difficulties, such as R/C transmitters or local paging systems.
- The receiver features Direct Servo Control (DSC) for control of surfaces without radio frequency output.
- The new NER-950S offers the highest resolution available in any receiver.
- The receiver has low current consumption.
- The receiver features 3-point gold plated connectors for increased conductivity.

## 1.3

### Digital Servos

#### JR Digital Servos

With the development of the new JR Digital Servos, JR has set the new standard in servo technology, a technology that has remained virtually unchanged for the past 25 years. Using a specially designed IC chip, and FET driven motor, JR has developed servos that are a cut above the current conventional servos. While a typical servo has a power pulse of 50Hz, JR's Digital servos have a pulse rate of over 250Hz, 5 times greater than that of a conventional servo. In addition, their ultra precise resolution (as high as 5,900 steps per 120 degrees) delivers exceptional accuracy.

#### The DS8231 features:

- A high frequency digital amplifier 5 times that of a conventional servo
- Super-tight deadband of .06  $\mu$ s for superior accuracy
- Up to 5 times more holding torque than a conventional servo with less than a 10% increase in current drain
- High output F.E.T. transistor driven motor
- High resolution of 5,900 steps per 120°
- 13 bit A/D converter

# 2

## Component Specification

### 2.1 System Specifications

System Name . . . . . J120FS Computer Airplane System  
 Transmitter (Main Body) . . NET-J120FS  
 (RF Module) . . NET-J72P, NET-J50P, NET-J53P  
 Receiver . . . . . NET-950S  
 Servos . . . . . DS-8231 Digital  
 Charger . . . . . NEC-222  
 Airborne Battery . . . . . 1400 mAh Sanyo Extra® NiCad

### 2.2 Transmitter Specifications

Model No. . . . . NET-J120FS  
 Encoder . . . . . 10 Channel Computer System  
 RF Module . . . . . 50/53/72 MHz  
 Modulation . . . . . PCM (S&Z) or PPM  
 Output Power . . . . . Approximately 750 mw  
 Current Drain . . . . . 200 mA (70 mA w/DSC)  
 Power Source . . . . . 1.2V x 8 NiCad (9.6V) 1100mAh  
 Output Pulse (in microseconds) . . . 1000-2000 (1500 neutral)

### 2.3 Servo Specifications

Servo	NES-8231 Digital
Torque (oz/in) . . . . .	88 oz/in
Speed (S/60°) . . . . .	.22
Input Pulse . . . . .	1.5 ms ±600µs
Power Source . . . . .	4.8–6.0 volts
Motor . . . . .	Coreless
Weight (oz) . . . . .	1.73 oz.
Size (W/L/H) . . . . .	.75" x 1.54" x 1.36"

### 2.4 Receiver Specifications

Model Number . . . . . NET-950S  
 Type . . . . . 10 Channel, PCM-ABC&W  
 Frequency . . . . . 50/53/72 MHz  
 Sensitivity (in microseconds) . . . . . 5 minimum  
 Selectivity . . . . . 8 KHz/50dB  
 Weight (oz) . . . . . 1.69  
 Size (W/L/H) . . . . . 1.5" x 2.09" x .82"  
 Receiver Antenna . . . . . 39" for all aircraft frequencies.

### 2.5 Charger Specifications

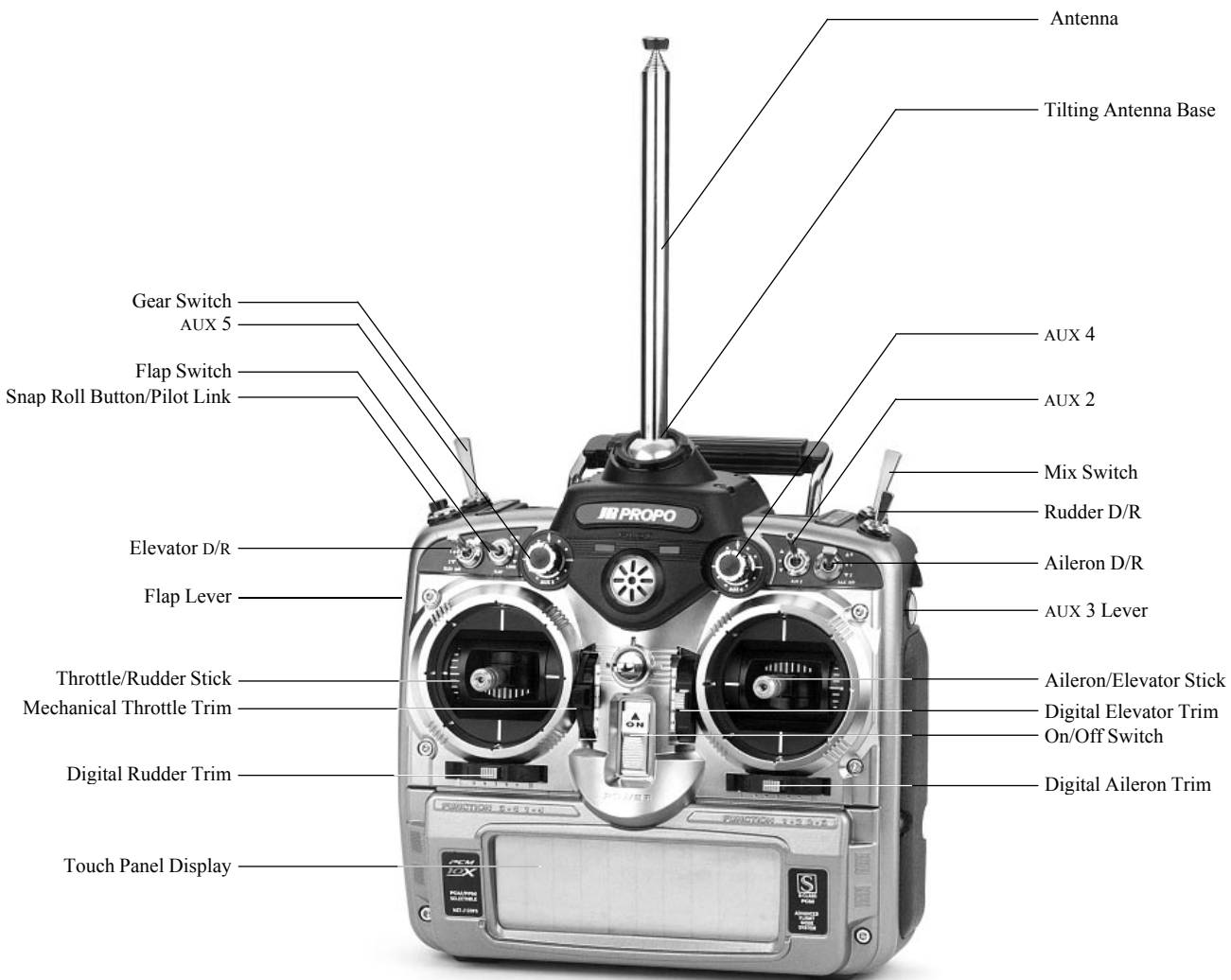
Model Number . . . . . NEC-222  
 Input Voltage . . . . . AC100-120v  
 Output Current . . . . . 50mAh Tx/120mAh Rx  
 Charging Time . . . . . 15 hours

### 2.6 Airborne Battery Packs

Type . . . . . 1400 mAh Sanyo Extra NiCad  
 Voltage . . . . . 4.8v  
 Size (W/L/H) . . . . . 2.64" x .70" x 2.00"  
 Weight (oz) . . . . . 5.4 oz

# 3

## Transmitter Controls



### 3.1

### Control Identification

#### Antenna

The adjustable base of the antenna can be locked into position by tightening the two Phillips head screws just to the rear of the antenna ball mount. Do not over-tighten. This feature allows you to determine and lock into place the antenna angle that suits you best.

The antenna can be removed and stored in the special compartment in the right side panel of the transmitter. The next time you fly, simply thread the antenna into the ball mount. It will automatically assume the previously set angle.

For a proper range test of the PCM10X system, please refer to Section 13, Daily Flight Checks.

#### Base-Loaded Active Antenna

An optional base-loaded active antenna is available for use with the PCM10X transmitter. It is considerably shorter than the standard antenna, but cannot be collapsed for storage in the side of the transmitter. The base-loaded antenna, part number JRPA155, is made of a flexible coil and is covered with a soft plastic material. Your range will not be affected when using this antenna.

## Channel Assignment

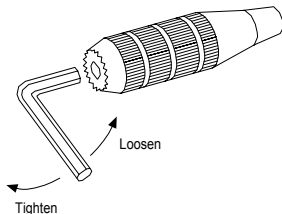
1. THRO Throttle Channel
2. AILE Aileron Channel
3. ELEV Elevator Channel
4. RUDD Rudder Channel
5. GEAR Gear Channel
6. AUX1 Auxiliary 1 Channel
7. AUX2 Auxiliary 2 Channel
8. AUX3 Auxiliary 3 Channel
9. AUX4 Auxiliary 4 Channel
10. AUX5 Auxiliary 5 Channel

### 3.2 Transmitter Rear



### 3.3 Control Stick Length Adjustment

The PCM10X allows you to adjust the control sticks' length.



To adjust the stick length, use the 2mm Allen wrench (supplied with your PCM10X transmitter) to unlock the set screw. **Note:** Turn the wrench counterclockwise to loosen the screw and clockwise to tighten it.

Turn the knurled part of the stick counterclockwise to lengthen and clockwise to shorten.

After the control stick length has been adjusted to suit your flying style, simply tighten the 2mm set screw.

If you desire longer sticks, JR has developed a replacement stick (*JRPA047*) that's approximately one inch longer than the standard sticks.

### 3.4 Neck Strap Attachment

An eyelet is provided on the face of the PCM10X transmitter that enables you to connect a neck strap (*JRPA023*). This hook has been positioned such that your transmitter will have the proper balance when the antenna is extended.

### 3.5 Adjustment of Stick Tension

The 10X allows you to individually tailor the tension of each of your stick control inputs to suit your flying style. The procedure is as follows:



1. Carefully remove the rear rubber grips. Do this by gently prying the grip by hand from the case.
  2. Carefully remove the lower right-hand rubber plug. (The upper left rubber plug is used for adjusting Mode 1 transmitters only.)
  3. Using a small Phillips screwdriver, rotate each adjusting screw clockwise to tighten its respective stick tension (counterclockwise to loosen).
- After achieving the desired stick tension, carefully replace the rubber grips and plugs.

## 3.6 Direct Servo Control (DSC)

Why you should use the DSC function:

**1. Reduced Current Consumption**—The DSC function enables you to check the control functions of your airplane without drawing the full 200mAh from your transmitter battery pack. Instead, you will only draw 70mAh when using the DSC function.

**2. Make Adjustments Without Transmitting**—The DSC function allows you to make adjustments to your airplane without transmitting any radio signals. Therefore, if another pilot is flying on your frequency, you can still adjust your airplane and not interfere with the other pilot's aircraft.

### Using the DSC Cord

For proper DSC hook-up and operation:

1. Leave the transmitter power switch in the "off" position. The transmitter will not transmit any RF in this position.
2. Plug the DSC cord (supplied) into the DSC port in the rear of the transmitter. The encoder section of the transmitter will now be operational and the LCD display will be active

*Note: Once the Pilot Link function is activated, the DSC function will not operate. To use the DSC function, the Pilot Link function must be inhibited temporarily.*

## 3.7 Frequency Notes/Aircraft Only Frequency

3. Plug the other end of the DSC cord into the receiver charge receptacle. Turn the receiver switch to the "on" position.

### Frequency Notes

The 10X employs a plug-in module system for transmitter frequency and band changes. If you wish to change a frequency, you can simply change the radio's module, commonly referred to as either an RF module or transmitter module. JR modules are universal for all JR aircraft systems. In other words, if you currently own a JR module, it can be used with the new 10X.

The 10X can transmit in either Pulse Code Modulation (PCM) or in Pulse Position Modulation (PPM). See page 63 for information about selecting modulation type (Code 85).

Be certain to observe the following guidelines:

1. Do not operate your transmitter when another transmitter is using the same frequency, regardless of whether the second transmitter is PCM, PPM, AM or FM.
2. For operation of your 10X with other models of JR receivers, please refer to the receiver compatibility chart, which is located in Section 8.25 on page 63 of this manual.

## Aircraft Only Frequencies

JR RF modules and receivers are available in 50, 53 and 72 MHz frequencies in the United States for use with model aircraft only. Operating on 72 MHz does not require a special operator's license from the Federal Communications Commission (FCC). However, operating on 50 and 53 MHz requires that you obtain a Technician II license.

- A chart for all available frequencies and their corresponding channels is located in Section 14 of this manual.

# 4

## Connections

### 4.1

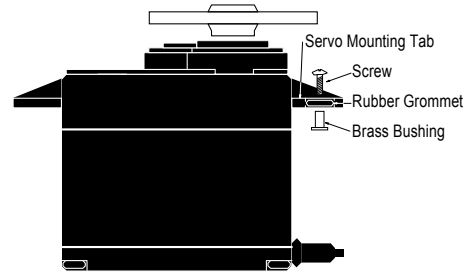
#### Installation Requirements

For the longest possible service life and best reliability and performance, the radio system should be correctly installed in your aircraft. Vibration, exposure to water or fuel, or exposure to excessive heat may cause premature component failure. Here are a few installation suggestions:

1. It's important to isolate the receiver from vibration. Wrapping the receiver in protective foam rubber that's no less than 3/8" thick and loosely securing the foam in the aircraft with rubber bands is an accepted and recommended practice. This not only protects the receiver from vibration, but also protects it in the event of a crash or a hard landing.

2. The servos should be mounted using the supplied rubber grommets and brass bushings to isolate them from vibration. Do not over-tighten the mounting screws—this will negate the vibration absorption effect of the rubber grommets. The diagram at right will assist you in properly mounting your servo.

The brass bushings are pushed from the bottom up in the rubber grommets. With the servo screw in place, this will provide the proper security, as well as the proper vibration isolation, for your servo.



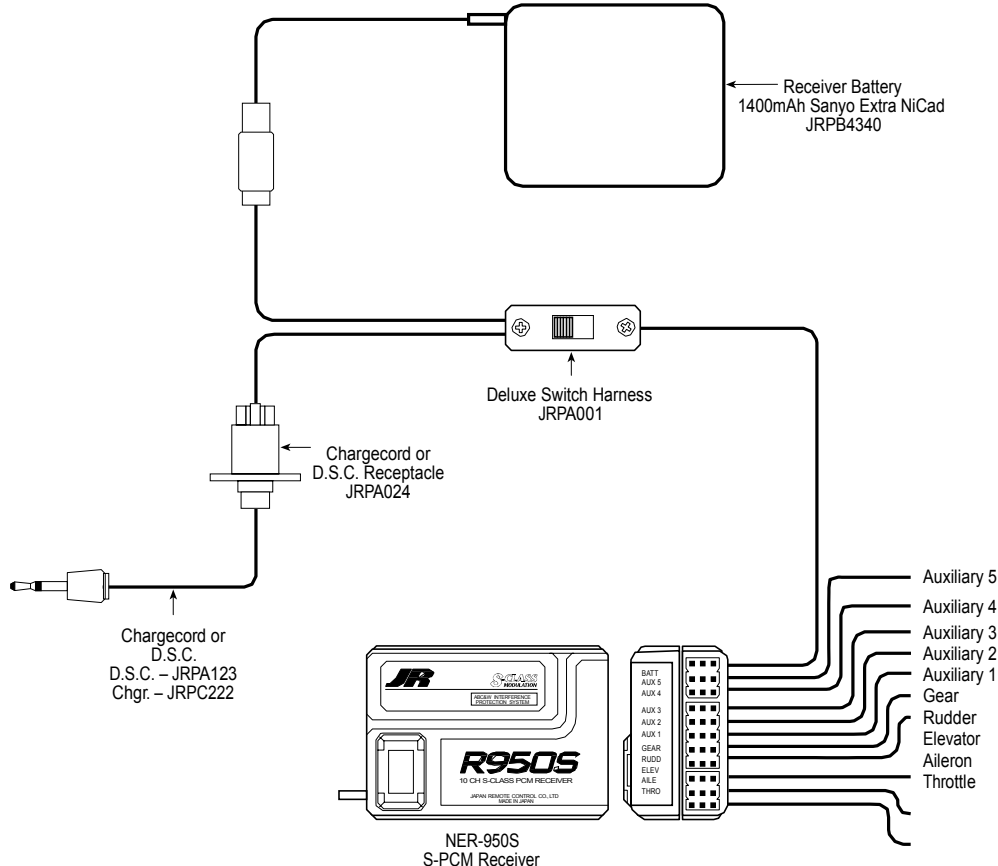
3. The servo arm must be able to move freely over its entire range of travel. Make sure that the control linkages do not bind or impede the movement of any of the servos.

4. Mount all switches away from the engine exhaust. Make sure the switch operates freely and is able to operate over its full travel.

5. Mount the receiver antenna securely inside the fuselage using a plastic tube or mount it to the airplane's vertical fin. It's important to route the antenna away from any RF-generating sources on the model, such as an ignition system, electric motors, etc.

### 4.2

#### Connections



# 5

## Display and Touch Panel

### 5.1

#### Care of the Touch Screen

Avoid dust, moisture and extreme temperature changes.

Do not press on the display panel with any sharp objects, such as ballpoint pens.

Clean the screen with a soft, dry cloth only. Never use solvents of any type to clean the display face.

The intensity of the screen will change with extreme temperature changes. This is normal and does not indicate a malfunction. The screen will return to normal once the temperature has stabilized. If necessary, adjust the contrast to read the screen in extreme temperatures.

### 5.2

#### Operating the Touch Panel

Basic operation of the panel is very simple. Just touch the key portion displayed on the LCD screen.

When you touch any key, a beeping sound will confirm your input.

The + and - keys have an automatic repeat function. To activate, simply keep your finger on the key.

*Note: The 10X has a two-speed scroll function. By touching the + or - key one touch at a time, you can make minute changes to the LCD display values. However, by keeping your finger on the + or - keys, the values will begin to change rapidly.*

When + CL - is displayed on the LCD display, you can either press the + and - keys simultaneously or the CL key. The respective function value will reset to the factory preset or default value.

#### Setting Percentage Display and Key Input

When setting percentages, the digital display will only read in the range of useful operation and will stop changing when the end of a range is reached, even though the beeping sound may still be heard.

# 6

## Alarm and Error Display

### 6.1

#### Battery Alarm

When the transmitter voltage drops below 9.0 volts, the display will flash the word "battery" and an audible alarm will sound. The audible alarm will sound four times consecutively, pause for a moment, then sound again, for a total of 24 times.

Notes pertaining to the battery alarm:

1. The word "Battery" will only flash if you are in the initial display screen. If you are in any other screen, you will only hear the beeping of the alarm. If you're flying when you hear this alarm, you should land immediately and recharge or replace the battery pack.



2. You will be unable to access Code 84 Model Select, Code 28 Data Reset, or Code 86 Data Transfer when the battery alarm has sounded.

### 6.2

#### Back-Up Error Alarm

A five (5)-year lithium battery protects all pre-programmed data against main transmitter battery failure. The lithium battery also retains all pre-programmed data in the event the transmitter battery pack is removed from the transmitter. Should the lithium battery fail, the display will indicate "back up err." and an audible alarm will sound. If this occurs, you will need to have the lithium battery replaced. All transmitter programs will return to the factory default settings, and the data you have entered will be lost and must be re-entered. When it becomes necessary to replace the lithium back-up battery, please contact Horizon Service Center. Improper removal or replacement can cause extensive damage, and only Horizon Service Center is authorized to make this battery change.

Horizon Service Center  
4105 Fieldstone Road  
Champaign, IL 61822  
217-355-9511

*Note: If you're flying when the lithium back-up battery fails, you will not lose control of your aircraft. However, when the transmitter power is turned off, all the programmed data may be lost. The included DataSafe (see page 64) can be used to store the programming on a personal computer in case the programming is lost in your radio.*

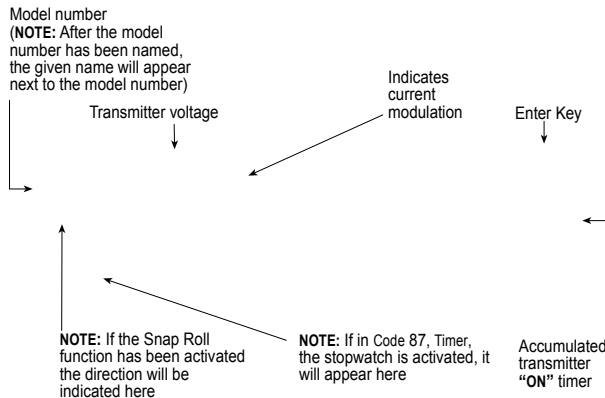
# 7

## Data Input

There are two methods you can use to enter data into your 10X transmitter—code number access and the direct mode method. Both methods work equally well, although the direct mode method will be easier until you become familiar with the code numbers of the 10X.

Turn the 10X power switch to the “on” position.

The initial LCD screen will appear as follows:



Touch ENTER to advance to the next screen. The screen will then change to the following:

From this screen, choose which method you want to use to input data.

### 7.1

#### Code Number Access

From screen number two above, press the code number of the function you wish to access. For example, if you wish to select the Servo Reversing function, look up the corresponding code number on the chart on page 12 (in this case Code 11). Enter 11 and the LCD will display 11 REV. SW. Now, press ENTER and the screen will display the Reverse function.

After you've completed the adjustments for the desired code number, press ENTER and the display will return to the Function Mode screen. Press ENTER again to return to the initial display screen.

### 7.1

#### Direct Mode Access

If at the second screen you are unsure of which code number to enter, simply push the D.LIST key. This brings up the first nine

(9) functions (numerically) on the display. This screen will display:

If the code you want to access appears on this screen, push the + key until the shaded box (now highlighting the Info function) highlights the chosen function. Next, press the ENTER key to bring up the function. After making the necessary adjustments, press the ENTER key once again. This will bring you back to the Function Mode screen. If at this point you touch the D.LIST key, the shaded box will return to the position you were at just prior to entering the desired code.

There are two ways to proceed to the next page of function selections:

1. Press the + key, advancing the highlighted box until the screen changes. This will occur if you press the + key one more time after reaching the last function on the selection screen.
2. Alternatively, press the PAGE key at any time to advance to the next 9 selections.

*Note: When changing screens in this manner, whichever function position is highlighted on the previous screen will continue to be highlighted. In other words, if the top right function is highlighted on page 1, when the PAGE key is pushed, the top right function will be highlighted on page 2.*

Refer to the following diagram for a graphic explanation:

**Result if + key is pushed**

**Result if PAGE is pushed**

# 8

## Code Functions

At the beginning of each code function, note that there is a brief explanation of the code and its function.

CODE #	DISPLAY	PROGRAM DESCRIPTION	CODE #	DISPLAY	PROGRAM DESCRIPTION
11	REV. SW	Servo reversing—all channels	56-58	MULTI-POINT PGM-MIX	Up to an 8-point programmable mix curve can be programmed and selected in any of the 5 available flight modes or a selected switch
12	TRAVEL	End point travel adjustments—all channels	62	A-R MIX	Aileron to rudder mixing
13	DR + EXP	Dual rates and exponential rate adjustments elevator/aileron/rudder. Can be adjusted independently for each direction	63	E-F MIX	Elevator to flap mixing
14	TRAC R	Trace rate affects the total travel of both servos when the master channel is aileron, elevator or rudder	64	R-AE MIX	Rudder to aileron and rudder to elevator mix
15	SUB TRIM	Electronic means of adjusting trim of all channels	66	FLAP S.	Flap system offers 3 position flaps with elevator compensation at each position. Flap positions are selectable in 5 available flight modes or on flap switch. An auto land function is available that will automatically retract the flaps if the throttle is advanced above a preprogrammed position
17	FUNC S.	Function select allows the controls for channels 5, 6, 7, 8, 9, 10 to be activated or inhibited, the flight modes to be selected and flap trim, flight mode trim and dual elevator trim to be selected	75	SERVO M	Servo monitor gives visual indication of all servo positions. Code 75 also has two servo test modes
18	THR.CURVE	Two multi point throttle curves can be programmed with up to 8 stored points. Each throttle curve can be selected via your choice of 8 switches or flight modes	77	F SAFE	Fail-safe memory and setting function in PCM only
22	WING T	Wing type allows the selection on normal, flaperons, elevons, quad flaps, V-tail and dual elevators as well as aileron differentials (2 available).	78	P LINK	Pilot link allows control of the 4 primary controls to be transferred to another JR radio via a trainer cord, while master still remains in control of secondary controls (i.e., flap, gear, mixes, etc.)
24	SPEED	Speed allows the independent selection of servo speed on each of the 10 channels in each of the 5 available flight modes.	81	M NAME	Model name input
28	RESET	Erases the programming in the selected model only and resets parameters to factory defaults	83	TRIM RATE	Trim authority is selectable for the 3 digital trim and the mechanical throttle trim
31	S. ROLL	Snap roll direction and values can be set and assigned to any of 5 flight modes	84	MODEL	Model select 1–10
44	GYRO	Up to 3 Gyro gain values can be individually adjusted and selected by the AUX 2 switch or in any of the 5 available flight modes. Stick priority mixing can be easily set up using the center and end values in the screen. The capability for using 2 gyros with independent adjustments is available in this function (Note: A remotely adjustable gyro must be used)	85	MODULATION	Modulation select SPCM, ZPCM, PPM
51-55	PGM-MIX	Programmable mixing selection and adjustment are selected in any of the 5 available flight modes or a selected switch.	86	TRANS	Model memory transfer only functional with another 10X or with included DataSafe.
			87	TIMER	Count-down, count-up and integrated timer functions
			88	K LOCK	Keyboard lock requires use of selected password to access programming

## Reversing Switches

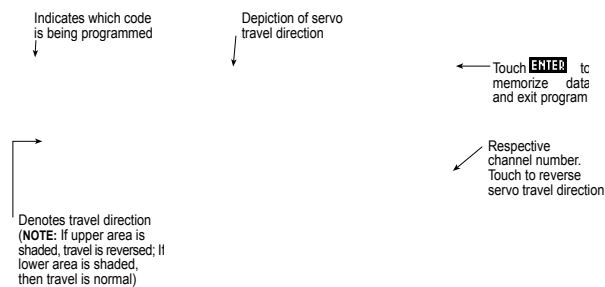
This is an electronic means of reversing the throw of a given (servo) channel. All ten (10) channels of the 10X offer servo reversing. This will ease setup during servo installation.

### Accessing and Utilizing the Servo Reversing Function

Prior to accessing the servo reversing feature, determine which servos' travel needs to be reversed. To do so, move the controls of your 10X and observe the travel direction of each servo. If the respective servo is not moving properly (i.e., not in accordance with the control input), then reverse its direction.

Upon determining which channels need to be reversed, access the Servo Reversing function by entering Code 11 in the code number access selection or by using the direct mode method.

The screen will appear as follows:



To reverse the travel direction of any servo (channel), simply touch the number that correlates to that channel. Note that the shaded portion of the upper box moves to the opposite position. This indicates the travel has been reversed.

Upon completing the servo's travel direction, press ENTER to exit this feature and memorize the servo travel direction.

*Note: Normal is the factory default setting for all channels. Data Reset (Code 28) will reset all servos to the normal direction.*

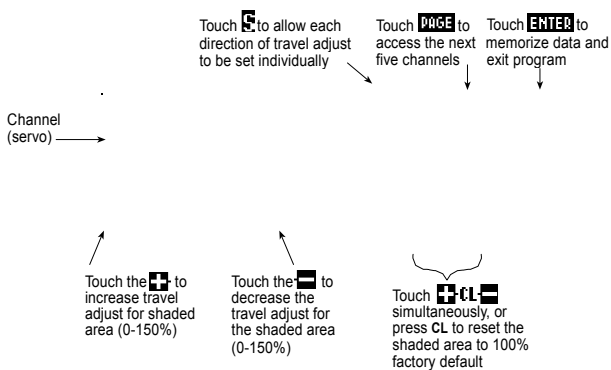
## Travel Adjust/ATV/ End Point Adjust

The purpose of Travel Adjust, also known as adjustable travel volume (ATV) or end point adjust, is to allow you to adjust the total travel of a servo in both directions. The 10X offers travel adjust for all ten (10) channels. The travel adjustment range is from 0% to 150% and can be adjusted for each direction individually. Use this function to set the maximum control throws that you'll use to fly the aircraft. However, make sure that servo travel is not so great that it causes binding by trying to move the surface past its physical limitations. A servo that is stalled causes high current drain and can cause radio drop outs, a condition where receiver voltage drops below its operational minimum, causing intermittent loss of control. A strong servo may also damage control surfaces and linkages if it travels too far.

### Accessing and Utilizing the Travel Adjust/ATV Function

To access the Travel Adjust function, enter Code 12 in the code number access selection or use the direct mode method.

The screen will appear as follows:



The 10X has a new feature that makes setting up travel adjust both quicker and easier. The 10X allows the option of both travel adjustment directions (up/down, right/left) to be adjusted either simultaneously or independently. From the factory default settings, the 10X is set to simultaneously adjust both direction indicated by the shaded area covers both direction values and an S appears in the shaded box at the top of the screen (see above screen). This is helpful in adjusting the overall rough travel values of the servos. To independently fine tune travel adjustment in each direction, press the S button at the top of the screen. The shaded area now only covers one of the values and only that value will be adjusted.

**Note:** In this mode the shaded box follows whichever direction you move the control. It is this value that you will be adjusting. Press the + key to increase the amount of servo travel and the - key to shorten the amount of servo throw. If you want to reset

the travel throw to the factory default, 100%, you can either press the + and - keys simultaneously or press the CL key.

After adjusting the travel volume for all ten (10) channels, press the ENTER key to exit this function and memorize these values.

**Note:** Any time you exit the Travel Adjust screen, the Travel Adjust function will revert back to the simultaneous adjustment mode.

## Dual Rate/Exponential Adjustments

Up to five programmable rates, each with their own exponential values, are offered on the aileron, elevator and rudder channels when flight modes are activated. (Three rates are available for aileron elevator and rudder in normal mode.) In addition, rate and expo values are independently adjustable in each direction, allowing you to perfectly tailor the response and feel of your aircraft. We've found this especially beneficial with aerobatic airplanes as the dual rate and expo values to achieve the same response/feel with up and down elevator can be quite different. Dual rates offer the ability to adjust the travel of the primary control surfaces (aileron, elevator, rudder) via a switch, thus altering the aircraft's response rate so specific maneuvers can be achieved. Aggressive maneuvers like 3D aerobatics or torque rolls require large control throws, while slow rolls, rolling circles or a landing approach require much smaller control throws to avoid over-sensitivity. Dual rates allow you to change your aircraft's response in flight.

Exponential does not affect the overall travel (end points) of the channel/servo. Exponential affects the rate at which the servo moves in intermediate positions (less than full travel) and is typically used to desensitize the neutral area such that minor corrections can be input easily to level the aircraft. When exponential is not used, the servo response rate is linear. That is, for every incremental step the control stick moves, the servo also moves in the same increments. If the stick moves 10%, the servo moves 10%. When Exponential is activated, a positive (+) Expo value causes the servo to move less than the stick when the stick is near the neutral position. For example, the stick may be moved 20% while the servo moves 10%. As the stick is moved further from center, the servo movement is increased, and at the extremes of travel, the % of servo travel is actually higher than the stick travel. The larger the (+) Expo value selected, the less sensitivity (reduced servo movement) will occur around neutral, but a greater sensitivity will occur at the extremes of travel.

As mentioned, Expo is typically used to reduce sensitivity around neutral stick positions while still having high control authority at the extremes of travel. This provides the pilot with very smooth, precise control while using relatively large movements with the

of +20% is a good place to start. This will give you the feel that Expo offers, but won't be so different than what you've been flying.

*Note: The 10X allows a negative (-) Exponential value to be programmed. This has the opposite effect as described above in that (-) Expo values will cause the control response to be greater (more sensitive) around neutral. Negative Expo values are very seldom used and should be tried with caution.*

Your 10X offers you your choice of five different response curves for your aileron, elevator and rudder controls. We suggest that you experiment with the curves, as they can greatly enhance the performance of your R/C aircraft.

The graphs below are shown to help demonstrate how each of the response curves differ:

**Graph 1** represents the normal, or linear, stick control. The servo response is equal throughout the stick movement.

**Graph 2** represents the normal stick control with the introduction of positive exponential. The response or rate of servo travel is less at the neutral point and increases as the stick reaches its travel limits. This type of exponential rate is useful if the controls are very sensitive around the neutral point.

*Note: If negative exponential were used, the response, or "feel," of the control would be opposite. The response, or rate, of servo travel would be greater near the neutral point.*

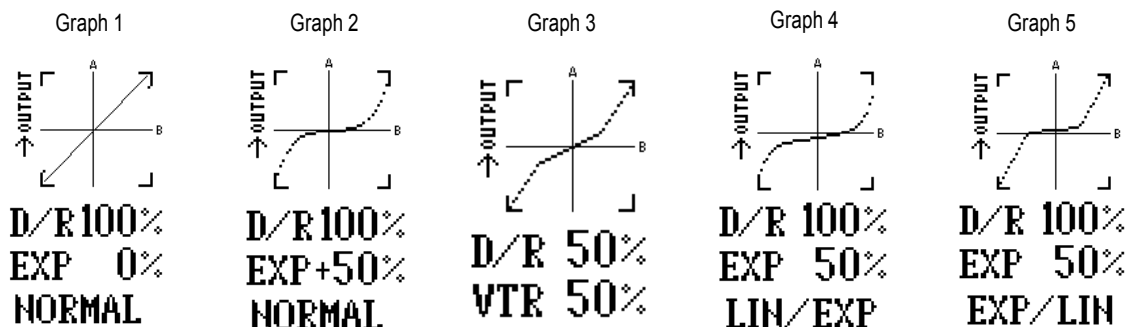
**Graph 3** represents the VTR (Variable Trace Rates). With the VTR feature activated, your transmitter operates in the dual rate mode until it reaches the selected VTR point (50%–90%). Control then switches to the higher rate.

**Graph 4** represents a combination of linear and exponential rates. Your control functions on a linear curve until it reaches 50% stick travel, where it switches to an exponential curve. In other words, it is a linear center and a expo curved at the extremes of travel.

**Graph 5** represents an Expo Linear curve. However, travel rates are exponential around center and then switch to linear after 50% of stick travel.

### Accessing and Utilizing the Dual Rates Function

The adjustable range for each of the dual rate switch positions is 0–100%. When Dual Rate is set to 100%, travel is equal to the travel set in Travel Adjust or ATV (Code 12), which can be from 0% to 100%. It may also be influenced by Trace Rate setting



(Code 14). To enter the Dual Rate function, enter Code 13 in the code number access selection or use the direct mode method. Touch the PAGE key to call up the desired channel (aileron, elevator, or rudder) for which you want to adjust the rate.

Select the switch position for which you want to adjust the rate. To select the switch position, move the dual rate switch (relative to the desired channel) to the proper setting 0, 1, 2.

**Note:** Dual rates can also be assigned to flight modes (Code 17). If flight modes are active, use the assigned flight mode switch to select the desired flight mode that the dual rates are to be adjusted in.

Next, adjust the rate for the channel and the switch position or flight mode that you have previously selected. To decrease the throw rate, press the - key. To increase the throw rate, touch the + key.

After the rates have been adjusted to your satisfaction, begin to adjust the exponential values. Remember that the exponential values do not change the total servo travel. They only alter the way in which this rate, or travel, is reached.

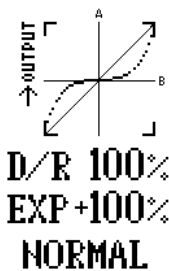
**Note:** If you are using Dual Rates and/or Exponential for the first time with a given model, it's recommended that you not use flight modes during these first flights. (See page 19, Code 17, for more details about flight modes.)

### Adjustment of the Exponential Curves

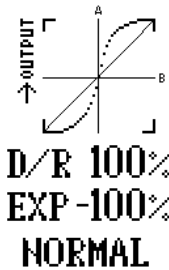
The adjustment range of the exponential curve is from 0% to  $\pm 100\%$  for each of the respective channels.

The greater the positive exponential value, the less servo action, or sensitivity, you will notice around the neutral setting. The greater the negative value, the more servo action, or sensitivity, you will notice at the neutral point.

The graphs at left may aid in understanding the exponential curve.



In the top graph, the response, or rate of servo travel, is less at the neutral point and increases as the stick reaches its travel limits. This positive exponential rate is useful if the controls are very sensitive around the neutral point. The solid diagonal line represents a linear response rate.



In the bottom graph, the response rate of this servo is greater around neutral and decreases as the stick reaches its travel limits. This negative exponential rate is useful if the control is very slow or un-

responsive around the neutral point. The diagonal solid line represents the linear response rate.

**Note:** Negative exponential rate is seldom used.

**Caution:** If using negative exponential for the first time, be careful, as this may cause the aircraft to be over-sensitive around neutral, and it may be very difficult to control.

To adjust the exponential rate, use the +, - and CL keys. The + key increases the exponential rate, while the - key decreases the response rate. To clear the exponential rates, touch the CL key, or the + and - keys simultaneously.

### VTR: Variable Trace Rate

This feature can be thought of as a double rates. When VTR is active, servo response follows the dual rate value until the selected VTR point is reached (50%, 60%, 70%, 80%, or 90%). When the VTR point is reached, the servo rate increases, and the servo follows the high rate determined by travel adjust.

### Summary of Response Curve Selections

NORMAL	Linear, D/R or Exponential Adjustments
VTR 50%	Will operate in dual rate mode until it reaches the selected
VTR 90%	VTR point; control VTR 90% will then switch to the higher rate
EXP/LIN	Up to 50% stick travel around center at pre-set exponential value and switch to linear
LIN/EXP	Up to 50% stick travel around center at pre-set linear value and switch to exponential

### Adjusting Dual Rates and Expo Value Independently in Each Direction

The 10X allows dual rates and/or Expo values to be independently adjusted in each direction of servo travel. This is extremely useful in that many aircraft have differing pitch, roll or yaw rates in each direction, and a different value is needed to achieve the same response and feel in both directions. It's typical for an aerobatic aircraft to require slightly more down dual rate and less Expo value to achieve the same feel for up and down elevator.

To independently adjust the dual rate or Expo value for each direction, simply move the appropriate stick in the desired direction, and the shaded box will highlight only the selected direc-

## Trace Rate

The purpose of the Trace Rate function is to simultaneously adjust the servo travel of the channel selected, as well as any channel(s) that are mixed to that channel. Trace Rate is available on the three primary controls only—aileron, elevator and rudder. This function is extremely helpful and can be used in the following example:

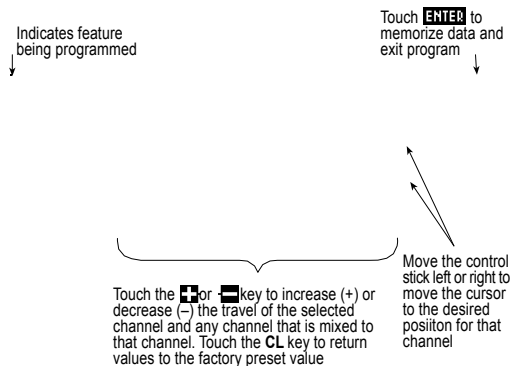
Two servos are used for the rudder, with one servo being plugged into the rudder socket in the receiver and the other servo being plugged into an auxiliary channel. A programmable mix is then used to mix rudder to the AUX channel being used. Adjust the travel adjust for rudder and the travel adjust for AUX until the servo throws are the same. Now to increase or decrease the throw of both rudder servos simultaneously, adjust the trace rate value. When using two aileron servos in flaperon, elevon or quad flap mode the aileron trace rate will affect both servos

### Accessing and Utilizing the Trace Rate Function

To access the Trace Rate function, enter Code 14 in the code number access selection or use the direct mode method.

Your screen will appear as follows:

Move the appropriate stick in the desired direction to highlight the



percentage to be changed.

Touch the + key to increase or the - key to decrease the travel of the selected channel and any channel being mixed to this channel. The adjustment range is from 0–150%.

*Note: In some instances, it's possible to overdrive the limits of the servo with a large value in Travel Adjust and Trace Rate.*

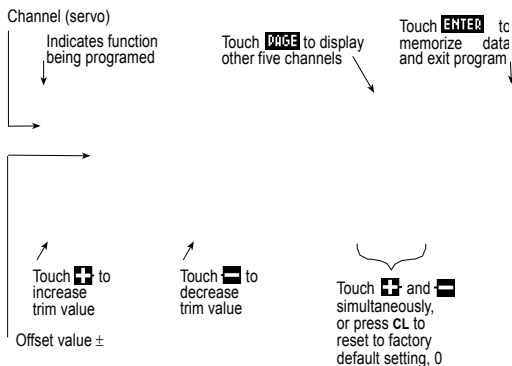
## Sub-Trim Adjustment

The Sub-Trim Adjustment is a feature that allows you to electronically fine tune the centering of your servos and is individually adjustable for all ten (10) channels with a range of +/-250% in 2% increments (+/-30° servo travel).

### Accessing and Utilizing the Sub-Trim Adjustments

To access the Sub-Trim Adjustments, enter Code 15 in the code number access selection or use the direct mode method.

The screen will appear as follows:



This feature enables you to electronically correct for slight mechanical misalignments that previously had to be corrected manually.

**Caution:** Do not use excessive sub-trim adjustments since it is possible to overdrive your servo's maximum travel if it is off-center. Remember that this is a trim convenience feature. It is not intended to take the place of the proper mechanical trim adjustments that are necessary on any R/C model. Offset servos can produce a differential throw effect.

Press the + or - key to increase the amount of sub-trim. To reset the sub-trims to the factory default of 0, press the + and - keys simultaneously or press the CL key.

After adjusting the sub-trims for the first five channels, touch the PAGE key to access the last five channels.

Upon completion of the sub-trim adjustments, press the ENTER key to memorize the settings and to exit the program.

**Note:** On previous generation of JR's 10-channel computer radios, the sub-trim adjustment values are adjustable from 0 to 125% in 1% increments. Your 10X is adjustable in 2% increments up to 250%. If you're transferring over sub-trim values from a previous generation JR 10-channel radio to the 10X, the sub-trim values of the older 10-channel radio must be doubled in order to properly match when programmed into the 10X.

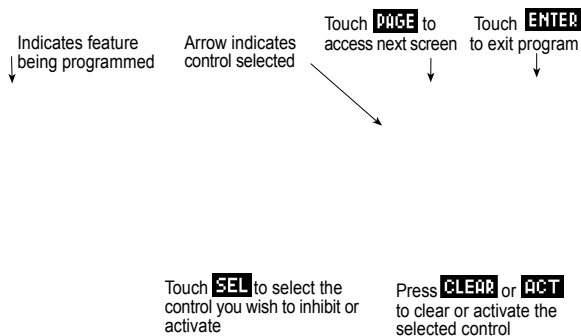
## Function Select

The Function Select function affects four different programming parameters. These include the activation or inhibiting of the gear, flap, AUX 2, AUX 3, AUX 4 and AUX 5 controls (levers, switches, knobs); the activation and switch selection of the flight modes; the activation or inhibiting of the flight mode trim, flap trim, and elevator roll trim.

### Accessing and Utilizing the Function Select Function

To access the Function Select function, enter Code 17 in the code number access selection or use the direct mode method.

Your screen will appear as follows:

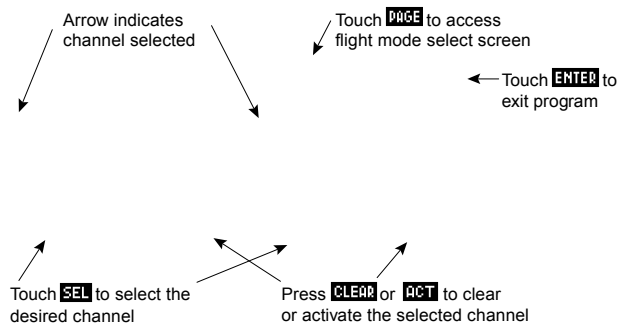


### Activating/Inhibiting the Gear, Flap, AUX 2, AUX 3, AUX 4 and AUX 5 Knobs, Switches and Levers

The 10X allows the activation or inhibiting of the gear, flap, AUX 2, AUX 3, AUX 4 and AUX 5 knobs, switches and levers.

Inhibiting allows these upper 6 channels to be used as slave mixing channels, while their corresponding levers, knobs or switches will have no effect on the servo output. It also allows an inhibited lever, switch, or knob to be used to control other mixing functions.

**Note:** When a knob, switch or lever is inhibited in Function Select the output assumes a neutral position



The following chart shows the function and the switch, lever or knob location and its corresponding channel.

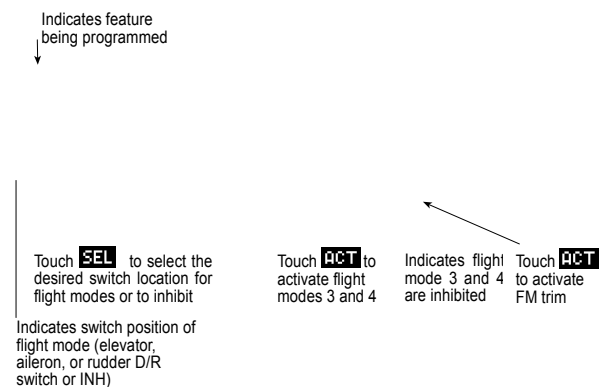
Function	Location	RX Channel
Gear	Top left back switch	5 or gear Flap
	Left side lever	6
AUX 2	Right front face	7
AUX 3	Right side lever	8
AUX 4	Rotary knob right front face	9
AUX 5	Rotary knob left front face	10

It should be noted that when a switch or knob has been inhibited, it can still be used to control mixing or other channels without affecting the control of the channel that the switch, lever or knob is normally associated with. See Origin Mix in the Programmable Mixing function (Codes 51-58) for more details.

## Flight Mode

To access the flight mode menu, touch page in Code 17, Function Select.

The flight mode menu located on the second page of Function Select, Code 17, allows you to inhibit/actuate the flight modes and to assign the flight modes to one of three switch locations. These switch locations include the aileron D/R switch, the elevator D/R switch or the rudder D/R switch.



## Flight Mode Trim

The 10X offers a unique feature called Flight Mode Trim that allows separate individual trim settings that are automatically selected in each of the available flight modes. When FM Trim and Flight Modes are activated, the digital trims will independently adjust the servo trim position only in the current Flight Mode that is selected. A useful example of FM Trim is when in Flight Mode 1 half flaps are deployed and in Flight Mode 2 full flaps are deployed. With FM trim activated, simply trim your airplane in normal flight (FM-0) then switch to Flight Mode 1 and retrim the elevator and any rolling tendencies using the digital trims. Then switch to Flight Mode 2 and repeat the process. The 10X will memorize each Flight Mode's trim settings automatically and

switch to those trim settings when that particular Flight Mode is selected. Also note that the trim setting for each Flight Mode is displayed on the info screen when each Flight Mode is selected.

**Note:** It's important to remember that when FM Trim is activated, any trim changes made affect only the Flight Mode that you are presently in and will have no effect on the trim in any other flight.

When FM Trim is inhibited, the digital trim positions affect all Flight Modes and changes made in any Flight Mode will affect all other Flight Modes.

## Flight Mode Switch Position

As illustrated above, the flight modes can be located in one of three positions, the aileron, elevator or the rudder dual rate switches. When a switch is selected, the other two switches are turned off and have no effect.

When only three flight modes are selected, programming the extra to INH causes the flight modes to function as follows:

Selected flight mode switch

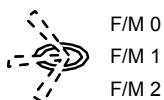


When only flight mode 0, 1, 2 are activated

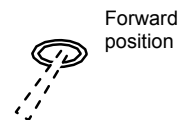
To activate Flight Modes 3 and 4, touch ACT below EXTRA in the flight mode screen.

Now, the mix switch, located on the back right of the transmitter, allows you to access Flight Mode 3 or 4 when it's flipped in the forward position.

Selected flight mode switch



Mix Switch



When EXTRA is activated, the above switch positioning allows you to access five flight modes.

**Note:** When the selected flight mode switch is in the upper, or away, position, Flight Mode 0 is always activated regardless of the position of the mix switch. It's recommended that Flight Mode 0 be used as a standard "safe setting" (we call it home base) so that in case of an emergency (flame out), returning this switch to the 0 position will deactivate any unusual setting, making for an easy dead stick landing.

## Utilizing Flight Modes

It is highly recommended that all pilots, regardless of their prior experience, take the time to become familiar with programming and using the system's individual functions and controls before proceeding with the more advanced Flight Mode feature.

The pilot should first program and fly the aircraft using basic functions. These initial flights will be very useful in trimming the aircraft, identifying its flight characteristics, and becoming familiar with the 10X programming, functions, and operation. The pilot can then proceed with programming other individual functions until the desired functions are operating satisfactorily. After this is accomplished, the pilot may, at his discretion, confidently proceed with programming and implementing the Flight Mode feature where individual functions are combined to form Flight Modes.

To assist you in obtaining the greatest possible benefit from the JR 10X Flight Mode feature, we have developed a procedure to guide you through programming Flight Modes. The procedure is straightforward, practical, and will allow you to program Flight Mode settings in a very safe, deliberate, and controlled fashion.

## Flight Modes

What is a Flight Mode? A Flight Mode represents an aircraft configuration that is designed or optimized to assist the pilot and the aircraft in performing a specific flight task, or group of tasks.

Examples of flight tasks include, but are certainly not limited to, the following: takeoff, landing, normal-speed maneuvering, high-speed maneuvering, snap rolling, slow-flight maneuvering, spot landing, smooth and graceful maneuvering, 3-D maneuvering, and a host of others that are defined by the variety of aircraft, accessories, and flying styles that exist in today's R/C hobby.

The objective of programming Flight Modes is to setup each Flight Mode (switch position) to provide an ideal aircraft configuration for performing a particular flight task(s). It has the effect of reducing the pilot's workload and optimizing the aircraft's performance in the flight envelope that is typically associated with the task (e.g., landing usually involves slow flight and maybe extended gear, lowered flaps, and other things that result in a high-drag airframe).

For instance, the pilot decides to use Flight Mode number 0 (FM-0) for landing. Switching to FM-0 on the transmitter lowers the landing gear, lowers the flaps, adds elevator and aileron trim to compensate for flap deployment, and selects the appropriate control throws to be effective at low landing speed. All of this (and more!) can be accomplished by flipping one switch to select FM-0. This represents a substantial reduction in the Pilot's workload and risk to the aircraft when compared to flipping multiple switches to the correct positions. The pilot's workload is further reduced by the fact that control rates/curves and other settings are selected to provide for optimum maneuvering at low landing speeds in the landing configuration.

The 10X contains a number of functions that include built-in programming for Flight Modes, including:

- Individual (up to 5) dual rates and exponential curves for aileron, elevator, and rudder
- Flap positions with elevator trim correction
- Servo speed for all 10 channels
- Three gyro gain settings are available on two channels simultaneously, including stick priority gain
- Aileron differential
- Snap roll settings for primary flight controls (rate/direction)
- Aileron-to-rudder mixing
- Rudder-to-aileron and rudder-to-elevator mixing
- Up to 8 programmable mixers (includes 3 multi-point mixers)

While the majority of the items listed above pertain to specific functions, the fact that eight programmable mixers are included provides the pilot with an unlimited number of other possibilities in determining the aircraft's behavior when a Flight Mode is selected.

## Flight Mode Programming

It's not practical to program all Flight Mode settings at one time, especially for a new aircraft. This approach would be difficult, time-consuming, risky, and would probably result in less-than-optimum Flight Mode configurations. Therefore, our recommended procedure is based upon a building block, or phased, approach that involves programming and adding functions to Flight Modes one at a time. This allows the pilot to program a function, test-fly the function with minimal risk, and fine tune the settings for optimal performance before adding the function to Flight Modes.

If the pilot has already programmed and flown individual functions, then the functions may be added to Flight Modes one or a few at a time without extensive testing. Follow the steps below to program Flight Mode features until you become familiar with the general approach and are ready to experiment on your own.

*Note: The 10X provides the option of having three Flight Modes (FM-0, FM-1, FM-2) or five Flight Modes (FM-0, FM-1, FM-2, FM-3, FM-4). Therefor, references to FM-0 – FM-4 may be replaced by FM-0 – FM-2 if the pilot has activated only three Flight Modes.*

## Preliminary Flight Mode Programming

When the Flight Mode feature is first activated, only one function is automatically associated with Flight Modes. This one function is the Dual Rate (D/R & EXP) function (Code 13), which affects the movements of the three primary flight controls (aileron, elevator, and rudder). All other functions and features are optional and can be assigned to Flight Modes at the pilot's discretion. Since the D/R&EXP function is automatically associated with Flight Modes when Flight Modes are activated, this function must be addressed first. Take some time to become familiar with

the explanations of the Flight Mode switches in Code 17. Pay particular attention to the note regarding the FM-0 (or "home base") position, and using this position to achieve "safe settings" for dead-stick or other emergency situations. The steps below provide for setting up dual rates and curves and assigning them to the Flight Mode.

With the flight modes activated in Code 17, use the DR&EXP function (Code 13) to select and program rates/curves for the ailerons, elevator, and rudder. The D/R switch to which you assigned the Flight Mode function is used to select the 0, 1, and 2 (and optionally 3 and 4) positions for each control for programming purposes. Simply move the switch to the desired flight mode position and then adjust the rate and expo for that flight mode. Refer to Code 13 for more information.

Once Flight Modes have been activated, two of the D/R switches become inoperative and will no longer select rates/curves. This activity is transferred exclusively to the third D/R switch you have selected to control Flight Modes--it is now the Flight Mode switch. This also applies to the D/R&EXP function itself should you wish to adjust one or more rates/curves. The Flight Mode switch must be used to select between the 0, 1, and 2 position for each control while in the D/R&EXP function (Code 13) in order to make adjustments to the rates/curves.

*Note: If you intend to set up Flight Modes for takeoff and landing, make a mental note of which Flight Modes (FM-0–FM-4) you are going to use for each. If the same aircraft configuration is going to be used for both takeoff and landing, then a single Flight Mode can be used. It will be necessary to remember which Flight Modes are for takeoff and landing if there are other functions that you wish to activate for these two modes, such as extending the landing gear and lowering flaps. Also be sure to select the appropriate D/R&EXP settings for takeoff and landing Flight Modes. Put some flights on the aircraft to become familiar with your Flight Mode switch(s), and the rates/curves that are active in each Flight Mode. Use the D/R&EXP function (Code 13) to adjust rates and curves until you're satisfied with performance. Preliminary Flight Mode programming is now complete. When you're comfortable with flying the aircraft in this basic Flight Mode configuration, proceed with programming, test flying, and adjusting the settings for the next function (if any) that is to be added to Flight Modes.*

## Retractable Landing Gear

If your aircraft is equipped with retractable landing gear and you would like to control them as a function of Flight Modes, this may be the next logical feature to program. The procedure

described below uses a programmable mix and the GEAR channel (channel 5) to mix the GEAR channel to itself.

**Note:** It is assumed that Flight Modes are already active, the pilot has identified a Flight Mode(s) to be used for takeoff and landing, and the D/R&EXP settings have been established as described above. It is also assumed that a Retract Servo is used to control the landing gear operation and the retract linkages have been adjusted for proper operation.

1. Make sure that the GEAR switch is active in the Function Select feature (Code 17).
2. Select an unused Program Mix (Codes 51-55). Enter "5" as the master and "5" as the slave, mixing the GEAR channel to itself. Touch ENTER to obtain the next Program Mix screen.
3. Pull the Retract Switch toward you and leave it in this position.
4. Touch STORE. (A negative percentage will appear under OFFSET. This value will typically be -85%.)
5. Touch PAGE to advance to the switch/position selection screen. Set the Flight Modes (FM-0 – FM4) that you will use for takeoff and landing (gear down) to POS-1. All other FMs and switches should indicate POS-0.
6. Touch PAGE twice to get back to the first Program Mix screen.
7. Position the Flight Mode switch to select a Flight Mode that will have the gear retracted (gear up). POS-0 should appear over the "0" percentages at the right of the screen.
8. Touch + until the percentage reads approximately 50% (anything over 30% usually works).
9. Touch ENTER to exit the Program Mix function and go to the Function Select feature (Code 17).
10. Inhibit the GEAR switch in Code 17, and then touch ENTER to exit Function Select.
11. Try the Flight Mode switch (not the retract switch) to see if the retracts work. If they work properly you are finished. If they do not work at all, proceed to the next step. If they work, but move in the wrong direction, go to Step 13 below.
12. If the retracts do not work at all, access the Program Mix (51-55) that was used in Step 2 above. Position the Flight Mode switch so that POS-0 appears over the percentage (50%). Touch TURN to change the percentage to "-". Now check retract operation again. If the retracts operate properly you are finished.
13. If the retracts work with the Flight Mode switch but move in the wrong direction, access the Program Mix (51-55) that was used in Step 3 above and touch PAGE to advance to the switch/position selection screen.

Now "swap" the POS-0 and POS-1 settings for FM-0 – FM-4 (change all POS-1s to POS-0s and all POS-0s to POS-1s). Leave all other switches set to POS-0. The retracts should now operate correctly with the Flight Mode switch.

## Flaps

If your aircraft is equipped with flaps or you're using the Flaperon feature and would like flap operation to be controlled as part of one or more Flight Modes, follow the steps outlined below.

**Note:** It is assumed that Flight Modes are already active and the D/R&EXP settings have been established. It also assumes that a flap servo(s) (or left aileron servo if Flaperon is active) is plugged into the Flap or AUX 1 channel of the receiver.

1. The Flap System description (Code 66) recommends inhibiting the Flap Lever in the Function Select feature (Code 17). So bring-up the Function Select feature (Code 17) and be sure that the Flap Lever on the first page of the display is inhibited.
2. Bring up the Flap System function (Code 66). With the transmitter and receiver turned-on, put the Flap Switch in the Mid position and touch + or - to set the flap throw in the Mid position. Then move the switch to the Land position and touch + or - keys to set the flap throw in this position.

If you already know the direction and approximate amount of elevator input that will be required to counteract pitch changes caused by lowering the flaps, enter elevator values at this time in the same fashion as was done for the flap throws.

3. Test-fly the aircraft and use the Flap switch to deploy the flaps at a safe altitude. Use the Flap System function (Code 66) to adjust the flap and elevator settings to obtain the desired flight characteristics for both the Mid and Land settings. Once you're comfortable with flap performance, proceed with the next step to assign the Flap System to Flight Modes. Don't worry if deploying the flaps causes the aircraft to roll or yaw, or otherwise be out of trim. This can be taken care of using the digital trims with Flight Mode Trim, Code 17 activated.

4. Bring up the Flap System function (Code 66) and touch PAGE to obtain the second screen of the display. Assign flap operation to each Flight Mode (FM-0 – FM-4) as described in the Code 66 function.

- Assigning a 0 to a Flight Mode inhibits flap operation for the Flight Mode. (Flaps cannot be deployed when this FM is selected, not even with the Flap switch).
- Assigning "FLAP" to a Flight Mode allows the pilot to use the Flap Switch to control flap deployment (MID and LAND) when the Flight Mode is selected. The flaps will be controlled in the same fashion as when the aircraft was test-flown in Step 3 above.
- Assigning "MID" to a Flight Mode will result in the flaps lowering to the Mid position whenever the Flight Mode is selected. The Flap switch is inhibited when this Flight Mode is selected.

- Assigning “LAND” to a Flight Mode results in the flaps lowering to the Land position. The Flap switch is inhibited when this Flight Mode is selected.
5. Double check your programming before flying the aircraft to ensure that the flaps deploy the right amount for each Flight Mode. Also check to see if flap deployment occurs in conjunction with other takeoff and landing activities, such as the gear extending. Thoroughly ground check Flight Mode activities and settings before flying the aircraft.
  6. Fly the aircraft to become familiar with the flaps operating as a part of your Flight Modes.

## Servo Speed

If less-than-normal servo speed is desired for one or more channels and Flight Modes have been activated, the Servo Speed function (Code 24) must be programmed for Flight Modes. The Servo Speed function allows the pilot to decrease the speed of any servos connected to the ten 10X channels (the function cannot increase a servo’s speed beyond its rated speed). A practical application of this function is to reduce the speed of the throttle servo to the extent that “jamming” the throttle stick cannot cause the engine to flood and die. It can also be used to provide a very slow throttle response that imitates the spooling-up of a jet aircraft, thereby adding another measure of realism.

*Note: It is assumed that Flight Modes are already active and the D/R&EXP settings have been established as described above.*

1. Access the Servo Speed function (Code 24). Touch MODE to cycle through the Flight Modes. For each Flight Mode in which you want to adjust the speed of one or more servos, touch + or - under the appropriate channel(s) to adjust the speed of servos that are plugged into the corresponding ports in the receiver. Values are provided in degrees per second. If a selected value is greater than the servo’s rated speed, the servo will move at its rated speed. This function cannot increase a servo’s speed above its rated speed.

*Note: Use caution if you decrease the speed of primary flight control servos. You may not be able to control the aircraft properly if the servos move too slowly.*

2. Ground test the servo speed settings to ensure that the proper settings are activated with the intended Flight Modes. Make adjustments as appropriate.
3. Fly the aircraft to become familiar with this additional Flight Mode feature.

## Gyro Gain

If your aircraft is equipped with a gyro and you would like the Flight Modes to control gyro gain, perform the steps provided below.

*Note: It is assumed that Flight Modes are already active and the D/R&EXP settings have been established as described above. It is further assumed that the gyro is equipped with an in-flight adjustment feature such as that found in JR’s NEJ-900.*

1. Plug the gyro into the AUX 2 port of the receiver and follow the directions provided with the gyro for other connections.
2. Access the Gyro Function (Code 44). Activate the function by touching SEL under INH and select the appropriate channels for gain (Aux2 or Aux3) and flight surface (RUDD, ELEV, AIL).
3. Move the AUX 2 switch to the upper position and touch + or - to set the position-0 gyro gain percentages. Now move the AUX 2 switch to the middle position and set the position-1 gyro gain percentage in the same fashion. Finally, move the AUX 2 switch to the lower position and set the position-2 gyro gain percentage. (See Code 44, page 38, for more details on setting up the gyros.)

*Note: It is strongly recommended that one of these positions be set for zero (0) percent gain where the gyro is essentially turned off. This will help to protect against a crash due to an over-sensitive gyro gain condition.*

4. Test-fly the aircraft and use the AUX 2 switch to test the gyro gain settings. Use the Gyro function Code 44 to make adjustments to the gain settings and test-fly again. Repeat this procedure until you’re satisfied with gyro performance in all three positions.
5. Access the Gyro function Code 44. Touch PAGE to obtain the Flight Mode screen. Now assign a gyro gain position (0, 1, 2) to each of the Flight Modes. Touching SEL under a Flight Mode (FM-0–FM-4) will cycle through the gyro gain positions—0, 1, and 2.
6. Fly the aircraft to become familiar with gyro gain controlled by the Flight Mode switch.

## Aileron Differential

If the aircraft is using a wing type of Flaperon, Elevon, or quad-flap where two channels are used for ailerons and the pilot would like to employ aileron differential based upon Flight Modes, follow the steps below. This procedure allows for assigning one of two aileron differential values to each Flight Mode. If one of these values is set to zero, you will be able to turn aileron differential on and off.

*Note: It is assumed that Flight Modes are already active and the D/R&EXP settings have been established. It is also assumed that a wing type of Flaperon, Elevon, or quad-flap is being used, where two channels are used for ailerons.*

1. Access the Wing Type function (Code 22).
2. If you would like a single aileron differential setting to be in effect for all Flight Modes, touch the + or - keys to set the amount of differential for the first position (P0) and touch TURN if necessary to obtain the proper direction. Programming is complete—touch ENTER to exit the Wing Type function.
3. At this point it is assumed you would like to switch between two aileron differential values. If one of these values is set to zero, you will be able to turn aileron differential off by selecting the position that has the 0 value. Touch PAGE to obtain the switch/position display. For each

Flight Mode that is to have an aileron differential greater than zero, touch SEL under the Flight Mode to indicate position P-1. Leave all other FMs and switches set to P-0.

4. Touch PAGE until the first Wing Type display appears. Move the Flight Mode switch to a position where P1 appears over the TURN indicator. Now touch the + or - keys to set the amount of differential for P1 and touch TURN if necessary to obtain the proper direction. Now all Flight Modes that are set to P-1 on the switch/position display will incorporate this amount of aileron differential.

If you would like aileron differential turned off for all other Flight Modes, programming is complete and you can touch ENTER to exit the Wing Type function. Test fly the aircraft and fine tune the differential setting as may be necessary.

5. If you would like to use a different amount of aileron differential for the Flight Modes that are set to P-0 on the switch/position display, move the Flight Mode switch to a position where P-0 appears over the TURN indicator. Now touch the + or - keys to set the amount of differential for P-0 and touch TURN if necessary to obtain the proper direction. Now all Flight Modes that are set to P-0 will incorporate this amount of aileron differential, while those set to P-1 will result in the amount of differential indicated for P-1. Test fly the aircraft and adjust the differential values as necessary.

## Snap Rolls

If the pilot wishes to assign snap roll directions and rates to Flight Modes, follow the steps below. This feature may be implemented without test flying, as it poses no undue risk to the aircraft if snaps are performed at a reasonable airspeed and altitude.

*Note: It is assumed that Flight Modes are already active and the D/R&EXP settings have been established as described earlier.*

1. Access the Snap Roll function (Code 31). Touch SEL under ACT until F. MODE appears.
2. Touch PAGE to obtain the next screen where the Snap Roll directions and positions are assigned to Flight Modes.
3. Set the snap roll direction for each Flight Mode (FM-0–FM-4) by touching the left SEL under each Flight Mode. Touching the left SEL will cycle through all of the directions (RU, RD, LU, LD).
4. Examine the direction that you have selected for each Flight Mode. If there are two or more Flight Modes that have the same direction (RU, RD, etc.) and you wish to have different throws (percentages) associated with this direction, proceed

with Step 5 below. If you want the same throws associated with a direction that is specified more than once, go to Step 6 below.

5. In order to specify different throws for the same direction; touch the right SEL under the appropriate Flight Mode(s) to indicate either P0 or P1. There is a limit of two sets of throws for each direction. The flight modes designated as P0 for a given direction will have one set of throws while the Flight Modes designated as P1 for the same direction will have another set of throws.
6. It is now time to set the throws (percentages) for the directions that have been established for each Flight Mode. Touch PAGE to return to the previous screen where the percentages are displayed and may be adjusted.
7. Set the Flight Mode switch to FM-0. Notice that the direction that was set for FM-0 on the previous screen is highlighted. Set the percentages of travel for the AILE, ELEV and RUDD using the + and - keys. These are now the snap roll settings for FM-0.
8. Next, move the Flight Mode Switch to FM-1 and set the percentages in the same fashion as described above for FM-0. Repeat the process for FM-2–FM-4.
9. Fly the aircraft and try the snap roll settings. Adjust settings using Code 31.

## Aileron-to-Rudder Mixing

If the pilot wishes to assign this type of mixing to Flight Modes, follow the steps below. This procedure allows for assigning one of two mixing values to each Flight Mode. If one of these values is set to zero, you will be able to turn the mixing on and off using the Flight mode switch. If the mix is to be turned on all of the time, program the POS0 percentages only, and set all Flight Modes to POS0 or program percentages for both POS0 and POS1.

*Note: It is assumed that Flight Modes are already active and the D/R&EXP settings have been established as described earlier.*

*Note: It is recommended that you initially leave the POS0 percentages set to zero and only program mix percentages into POS1. This will allow you to turn the mix on (POS1) and off (POS0) with the Flight Mode switch for initial test flying and adjustment. The steps provided below will take you through this setup process.*

1. Access the Aileron-to-Rudder Mix function (Code 62) and refer to the appropriate section of the manual.
2. Program left and right mix percentages into POS1.

3. Touch PAGE to obtain the switch/position display. Identify the Flight Mode where the mixing will be activated. Touch SEL under this flight mode to indicate that it will use POS1. Leave all other switches set to POS0. Now mixing will be activated only when this Flight Mode is selected.
4. Test fly the aircraft and test the mixing by selecting the Flight Mode that was indicated as using POS1. Adjust the mixing percentages using Function Code 62 to obtain the desired amount of mixing.
5. You may now return to Code 62 to program the POS0 settings and/or to assign the mixing values to other Flight Modes. Remember, in order to be able to turn mixing off using the Flight Mode switch, one of the positions (POS0 or POS1) mixing values must be set to zero.

## Rudder-to-Aileron/Elevator Mixing

This function is useful for mixing out pitch and roll coupling that results from rudder input, such as in the knife edge attitude. If the pilot wishes to assign this type of mixing to Flight Modes, follow the steps below. This procedure allows for assigning one of two mixing values for both the Aileron and Elevator to each Flight Mode. If one set of values is zero for both the Aileron and Elevator, you will be able to turn the mixing on and off using the Flight Mode switch. If the mix is to be turned on all of the time, program the POS0 percentages only and set all Flight Modes to POS0, or program percentages for both POS0 and POS1 to always have one of two values activated.

*Note: It is assumed that Flight Modes are already active and the D/R&EXP settings have been established as described earlier.*

*Note: It is recommended that you initially leave the POS0 percentages set to zero for both the Aileron and Elevator mix and only program mix percentages into POS1. This will allow you to turn the mix on (POS1) and off (POS0) with the Flight Mode switch for initial test flying and adjustment. The steps provided below will take you through this setup process.*

1. Access the Rudder-to-Aileron/Elevator Mix function (Code 64) and refer to the appropriate section in the manual.
2. Program POS1 mix percentages (if any) for the ailerons. Touch PAGE and program POS1 percentages (if any) for the Elevator

3. Touch PAGE to obtain the switch/position display. Identify a Flight Mode that is not used for takeoff or landing. Touch SEL under this flight mode to indicate that it will use POS1. Leave all other switches set to POS0. Now mixing will be activated only when this Flight Mode is selected.
4. Test fly the aircraft and test the mixing by selecting the Flight Mode that was indicated as using POS1. Adjust the mixing percentages using Code 64 to obtain the desired amount of mixing.
5. You may now return to Code 64 to program the POS0 settings and/or to assign the mixing values to other Flight Modes. Remember, in order to be able to turn mixing off using the Flight Mode switch, one of the position's (POS0 or POS1) mixing values must be set to zero for both the Aileron and Elevator. Furthermore, if both mixes are to be turned on and off at the same time, then both of the zero percentages must be programmed to the same position. For example, AILE POS0 = 0 and ELEV POS0 = 0, or AILE POS1=0 and ELEV POS1 = 0.

## Programmable Mixing

The pilot may assign up to 8 programmable mixes to Flight Modes. You may assign one of two mix values for each programmable mix to each Flight Mode. If one of these values is set to zero, you will be able to turn the mixing on and off using the Flight Mode switch. A programmable mix can be permanently active by setting the POS0 percentages only and setting all Flight Modes to POS0, or by programming percentages for both POS0 and POS1.

*Note: It is assumed that you are familiar with the standard and multi-point programmable mix functions as described in Codes 51-58. It is also assumed that Flight Modes are already active and the D/R&EXP settings have been established. It is recommended that you initially leave the POS0 percentages set to zero and only program mix percentages into POS1. This will allow you to turn the mix on (POS1) and off (POS0) with the Flight Mode switch for initial test flying and adjustment.*

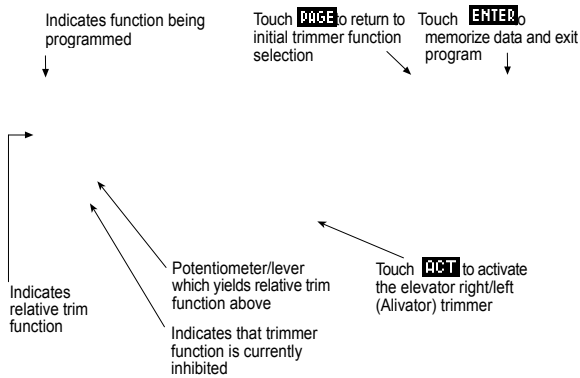
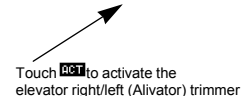
1. Access a Programmable Mix function (Code 51-58) and refer to that section of this manual.
2. After selecting the master and slave channels, touch ENTER. **Note:** Select NORM or CURV before pressing ENTER if a multi-point mix is being used.

3. Touch PAGE until the switch/position display appears. Identify a non-critical Flight Mode that will be used to test the programmed mix. Touch SEL under this Flight Mode to indicate that it will use POS1. Leave all other switches set to POS0.

Now mixing will be activated only when this Flight Mode is selected. Note: If all Flight Mode positions are critical (pose significant risk for the aircraft), then use one of the other switches for testing purposes.

4. Touch PAGE and select the type of mix (Normal, Include, Origin) and whether or not the Trim feature is to be enabled.
5. Touch PAGE until the mixing percentage screen is displayed. Move the Flight Mode switch (or the switch that was selected in Step 3 above) until POS1 appears over the percentages.
6. Set the mix offset (if any) and set the mixing percentages as may be appropriate for the desired mixing activity. Thoroughly ground test the mix.
7. Fly the aircraft and test the mixer by selecting the Flight Mode (or other switch that was used in step 3 above) that was indicated as using POS1. Adjust the mixing parameters in the Function Code that was used in step 1 to obtain the desired results.
8. You may now return to the Programmable Mix (51-58) to program the POS0 settings and/or to assign the mixing values to other Flight Modes. Remember, in order to be able to turn mixing off, either POS0 or POS1 values must be set to zero.

With dual elevator active, the right side level can be utilized as alevator trim lever (elevator halves in opposite directions). This is helpful for adjusting loop tracking.

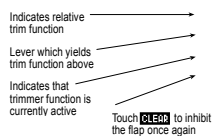


## Trimmer Function (Flap)

The flap lever, when active, raises or lowers the flaps in unison with one another.

To activate the flap lever, touch the PAGE key to get to the necessary trim function, touch the ACT key under “flap.”

This portion of the LCD screen will appear as follows:



*Note: The flap trimmer function also appears when normal, flaperon or elevon wing type is selected and can be inhibited or activated as described above.*

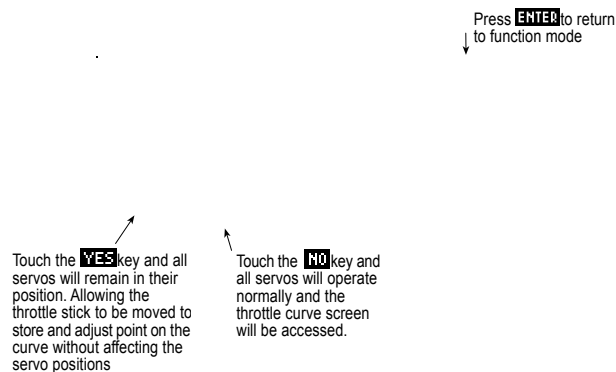
## Programmable Throttle Curve

The 10X allows for up to two programmable throttle curves to be programmed and selected via flight modes or switches. The throttle curves allow for up to eight points to be stored and manipulated. Typical uses for throttle curves include: adjusting the curve to achieve a more linear throttle response; desensitizing a particular part of the throttle stroke to maintain a more consistent throttle setting that's typical for rolling circles or torque rolls; or for giving reduced throttle range (high and low, which is useful for stall turns, etc.) in any selected flight mode or switch position.

### Accessing Throttle Curve

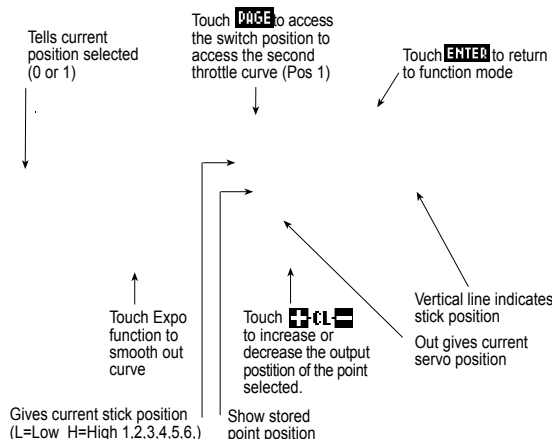
To access Throttle Curve, enter Code 18 in the code number access selection or use the direct mode method.

The screen will appear as follows:



Pressing yes with hold all servos in their positions. This would be necessary if the engine was running and you wanted to change the throttle curve without shutting off the engine. Selecting no will allow all servos to operate normally. This is useful for seeing exactly how the adjustments you make are affecting the throttle position.

Pressing yes or no, the screen will now look like the following:



Adjusting the throttle curves is very similar to adjusting multi-point programmable mixing (Code 56-58). Note that up to 8 points can be stored and manipulated, including the low (L) and high (H) points.

### Graphic Throttle Curve

The graphic throttle curve located on the right side of the screen is a useful reference when adjusting or storing points. Up to 8 points can be stored at desired positions and each point can be moved to any position from 0 to 100%.

### Adding New Points

Any time STORE appears on the bottom of the LCD, you can add a new point on the curve. Move the throttle stick and note that the vertical line where the cursor is located can be moved to any desired position. To store a new point, move the throttle stick to the desired position and touch the STORE key at the bottom of the screen.

### Clearing a Stored Point

When the display's cursor indicates that the throttle is in the position of a point you wish to clear, pushing the CL key or the + and - keys simultaneously will clear that point. As a result the remaining points' numbers will change accordingly.

### In and Out

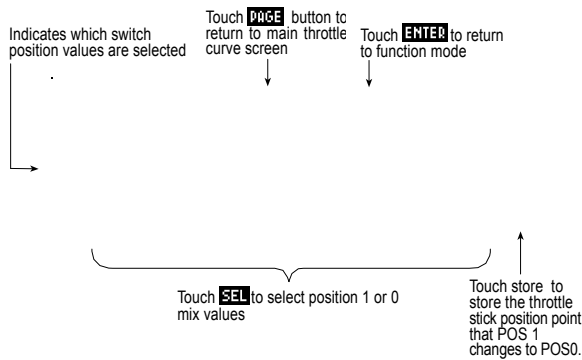
IN refers to the throttle stick position. OUT refers to the actual position of the throttle servo. The range of each point is adjustable from 0-100% using the + or- keys.

### Exponential Function

The Exponential Function allows you to smooth the selected curve. Touch the SEL below the EXP to activate the Expo function.

## Switch Selection

Two throttle curves are available and can be selected via a switch or Flight Mode. Touch the PAGE key until the following page appears.



*Note: If you only want one throttle curve, adjust the desired mix value in POS 0 and leave all switches in the 0 position.*

Two throttle curves are available—Position 0 throttle curve and Position 1 throttle.

Select the desired switch(es) for position 1 and 0, then touch the PAGE key. Flip the switch selected to select POS 0 or POS 1 in order to make adjustments to the desired throttle curve.

*Note: Position 1 has priority over Position 0 such that if a switch or flight mode is assigned to POS 1 and that flight mode or switch is activated, the Position 1 throttle curve will be in effect.*

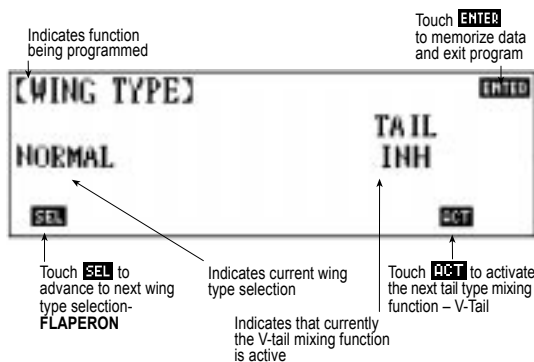
## Wing Type Selection

The purpose of the Wing Type Selection function is to eliminate mechanical or programmable mixes that would otherwise be necessary for the proper flight of certain styles of aircraft. There are four wing types from which to choose; select the one which will best suit your aircraft. They are: normal, flaperon, elevon and quad flaps. You can also activate the V-tail or dual elevator mixing features for V-tailed or dual elevator servo aircraft for any of the wing type mixing selections with the exception of elevon.

Each of the wing type selections and the V-tail and dual elevator mixing are explained below.

### Accessing and Utilizing the Wing Type Selection Function

To access the Wing Type Selection function, enter Code 22 in the code number access selection or use the direct mode method. Your LCD screen will appear as follows:



### Normal Wing Type Selection

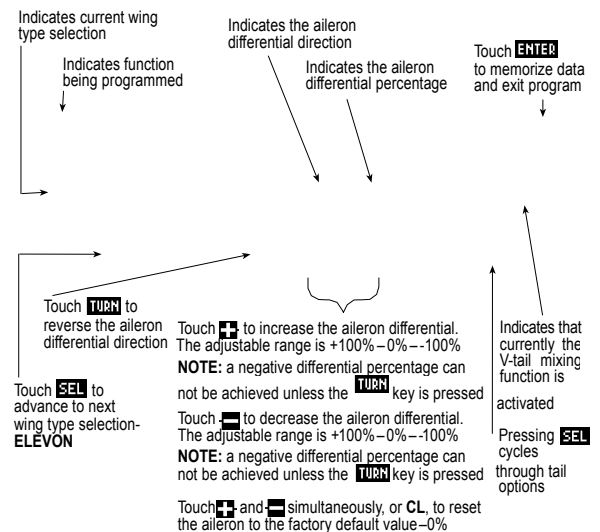
This is the first wing type selection which appears on your LCD display. Use this wing type with common aircraft that utilize only one servo for both of the ailerons.

Normal is the factory default setting for the wing type selection. This means that if Code 28, Data Reset, is performed, your radio will return to this wing type selection.

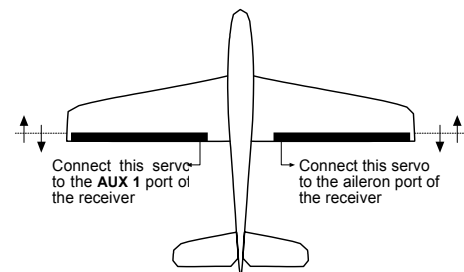
### Flaperons

Touch SEL to activate the next wing type selection —flaperons. Flaperon control surfaces will move with both aileron and flap commands.

The most common use of the Flaperon Mode is to allow the ailerons to be controlled by two or more servos on two separate channels. Flaperons also allow the use of ailerons as flaps. The ailerons can be raised or lowered in unison as flaps, yet still remain fully operational as the ailerons.



Touch + and - simultaneously, or the CL key, to reset the aileron to the factory default value of 0%.



### Flaperon Operation

1. One servo must be used for each aileron, i.e., a separate servo for each aileron.
2. Connect the left aileron servo to the auxiliary 1 port (AUX1/FLAP) of your receiver. Plug the right aileron servo into the aileron port (AILE) of your receiver.
3. Check to make sure that the servos move in the proper direction. For a right turn, the right aileron should raise while the left aileron lowers simultaneously. For a left turn, the opposite is true—the left aileron should raise while the right aileron drops. If your servos are not moving in the manner (direction) we have just described, utilize the Servo Reversing function, Code 11, to reverse the travel direction of the servo(s) that are moving improperly. (Right aileron – channel 2, Left aileron – channel 6)
4. Once the servos achieve their proper travel direction, adjust their travel volume, dual rates, sub-trim, and aileron differential.  
**Note:** The applicable channel's left or right travel adjustment may be made individually in Code 12, Travel Adjust. Once they are adjusted to travel and center together, use Trace Rate (Code 14) to adjust travel for both ailerons at the same time. Please see Section 8.2 and 8.4 for more travel adjustment details.

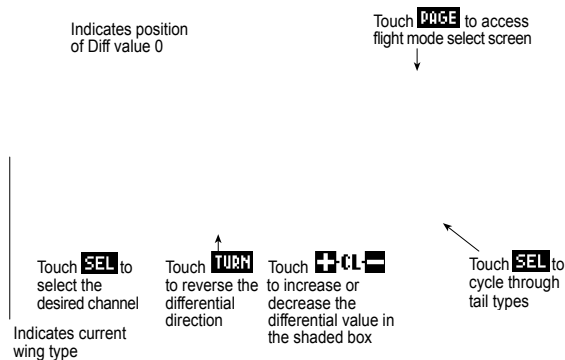
## Differential Rate

The 10X transmitter offers aileron differential for the flaperon wing type selection. Differential ailerons are used to tailor the flight control system to a particular aircraft. Because the downward travel of the aileron creates more drag than does the upward travel, it is necessary to reduce the amount of down travel for each aileron. This drag may produce a yawing tendency in your aircraft, causing poor roll tracking. Aileron differential overcomes the yaw as it reduces the downward travel of the applicable aileron.

**Note:** In the programmable Mixing functions, Codes 51-58, Section 8.11 of this manual, you can employ the aileron differential in the mix. This is only applicable where the aileron channel is the master or mixed-to channel and does not appear in any other circumstance.

### Differential/Aileron Rate Switch Selection

Two differential rate settings can be selected and programmed to be activated in any or all of the flight modes or with a variety of switches. Differential aileron rate is only available when flaperon, elevon or quad flap is selected in wing type and two servos (one for each aileron) are utilized and plugged into the correct receiver channels (2 and 6).



**Note:** When Flight Modes are activated, they replace the corresponding switches below:

Flight Mode Active	Flight Mode Inhibited
F0 (Flight Mode 0)	E-F (Elevator to Flap Switch)
F1 (Flight Mode 0)	M-D (Flap Switch Mid Position)
F2 (Flight Mode 0)	L-D (Flap Switch Land Position)
F3 (Flight Mode 0)	MX (Mix Switch)
F4 (Flight Mode 0)	AU (AUX 2 Switch Up Position)
Always Available	GER (AUX 2 Switch Down Position)
Always Available	SNP (Snap Button)
Always Available	STK (Throttle Stick)

**Important:** Position 1 always takes priority over Position 0 such that if any switch is turned on and is programmed to Position 1, Position 1's differential value will be activated.

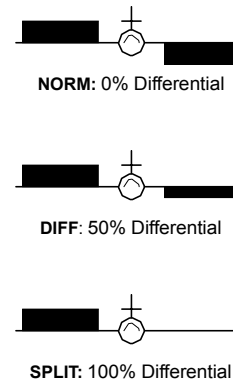
### Adjusting the Differential Rate:

The differential rate is adjustable from  $\pm 100\%$ . To increase the differential rate, touch the + key. The percentage values increase accordingly. If the aileron differential is increasing opposite to the desired direction (more up than down aileron control throw), touch the TURN key. This resets the direction of the aileron differential while still retaining the differential percentage value. Your LCD confirms the negative value by replacing the + below the dif-rate with a - symbol. If you want to decrease the amount of aileron differential, touch the - key.

If left at 0%, the ailerons maintain equal travel for both sides. That is, there will not be any differential whatsoever.

If set at 50%, the aileron that is lowered travels 50%, or half, as far as the upward aileron. If adjusted to 100%, you achieve what is commonly referred to as a "split." This means that the only aileron that moves is the aileron that travels upward. The aileron that normally drops remains stationary.

A graphic interpretation of the aileron differential feature would appear as follows:



To reset the differential value to the factory default of 0%, touch the + and - keys simultaneously or touch the CL key.

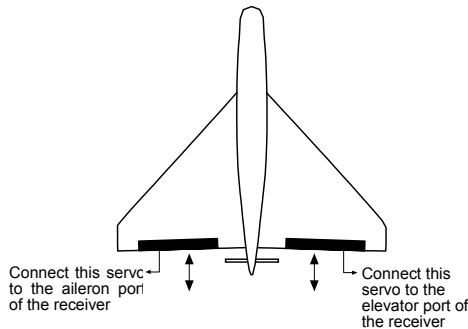
### Elevon

On delta wing, or elevon, style aircraft, the wing control surfaces function together as elevator inputs and in opposition to one another as ailerons. Thus the name elevon.

Touch the SEL key one time from the flaperon wing type to select the elevon style wing. If you want to access elevon from the normal wing type selection, touch the SEL key two (2) times.

The elevon wing type is also commonly referred to as a delta wing aircraft. This style of aircraft also employs two wing servos. However, in essence there is not an elevator present. Instead, elevator stick input causes the two wing servos to function in conjunction with one another to create an up/down movement of the aircraft. In other words, the wing itself functions as if it were the elevator. Also, when an aileron control is given, the two wing servos move in opposition to one another to function as ailerons.

## Elevon Operation



1. One servo must be used for each elevon, i.e., a separate servo for each wing half.
2. Connect the left elevon servo to the aileron (AILE) of your JR receiver. Plug the right elevon servo into the elevator port (ELEV) of your receiver.
3. Check to make sure the servos move in the proper directions. When an input is given from the elevator stick, they should move in unison to achieve the proper up/down elevator command. If your servos do not move in the proper manner (direction) as described above, use the servo reversing function, Code 11, to reverse the travel direction of the servo(s) that are moving improperly.

**Note:** Each servo's travel direction is adjusted individually. Refer to Section 8.1 of this manual for more information regarding servo travel direction.

4. Once the servos have achieved their proper travel direction, adjust their travel volume, dual rates, sub-trim and aileron differential.

**Note:** Adjust the neutral point of your elevon servos individually. To do so, use Code 15, Sub-Trim, as described in Section 8.5 of this manual.

**Note:** The applicable channel's left or right, up or down, travel adjustments can be made individually in Code 12, travel adjustment. Please refer to Section 8.2 of this manual for more information regarding the travel adjustment.

5. Relative to the note above, each servo's travel volume is automatically reduced to 75% of the operating range. This is to ensure that the servo does not operate beyond its capabilities. Failure to observe caution when adjusting the value for the

elevon servos can result in damaged servos or worse!

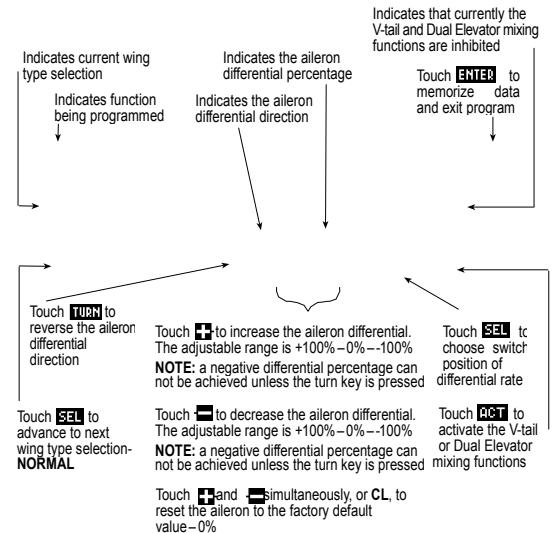
**Note:** Fine adjustments of the elevons should be made in the Dual Rates function, Code 13. Refer to Section 8.3 of this manual for further information on the Dual Rate function.

6. To adjust the wing differential and switch positions, refer to the wing differential feature section on the previous page.

**Note:** The V-tail mixing and dual tail selection is automatically inhibited in the elevon wing type selection.

## Quad Flaps

Touch the SEL key one time from the elevon wing type to select the quad flap style wing. If you want to access quad flaps from the normal wing type selection, touch the SEL key three times. This style of wing employs four wing servos. The two inboard servos function mainly as flap controls, while the two outboard wing servos function mainly as ailerons.



## Quad Flap Operation

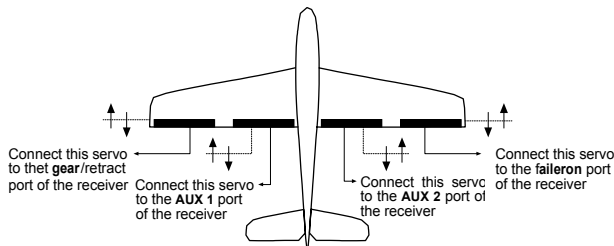
1. One servo must be used for each control surface. Therefore, you must employ four wing servos for this wing type selection.
2. Connect the left aileron (outboard) servo to the gear (retract) port of your receiver. Plug the left flap (inboard) servo into the auxiliary 1 (AUX 1) port of your receiver. Connect the right flap (inboard) servo to the auxiliary 2 (AUX 2) port of your receiver. Plug the right aileron servo into the aileron (AILE) port of your receiver.
3. Check to ensure that the aileron and flap servos are moving in their proper directions.

If your servos are not moving in the proper manner (direction) as dictated by the gimbal stick, lever, or potentiometer control inputs, use the Servo Reversing function, Code 11, to reverse the travel direction of the servo(s) that are moving improperly.

- Once the servos have achieved their proper travel direction, adjust their travel volume, dual rates, sub-trim and aileron differential.

**Note:** Adjust the neutral point of your aileron and flap servos individually using Code 15, Sub-Trim, as described in Section 8.5 of this manual.

**Note:** The applicable channel's left or right, up or down travel adjustment can be made individually in Code 12, Travel Adjust. Refer to Section 8.2 of this manual for more information regarding the travel adjustment.



- To adjust the aileron differential, use the settings on the quad flap screen.

**Note:** When quad flaps are selected, the original channel functions are disconnected from the transmitter. For example, we are currently using the gear (retract) channel for our left aileron servo. If the retract switch is moved, the aileron servo remains stationary. This safety feature eliminates any possible frustration from accidental switch movements.

**Note:** The retract switch can be used to operate an unused AUX channel by mixing Gear to that AUX with a programmable mix and activating the Origin Mix function. The gear switch will have no affect on the flaps, but will properly operate the selected AUX channel.

## V-Tail Mixing

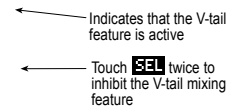
The V-tail mixing is also referred to as ruddervator mixing. This function is designed for use on aircraft that employ a V-tail, rather than the standard rudder/elevator combination found on most aircraft.

In the ruddervator, or V-tail mix, the two tail control surfaces function in unison to operate as elevator and rudder.



Elevator and rudder gimbal stick inputs yield both elevator and rudder responses from the control surfaces.

To activate the V-tail mixing feature, touch the ACT key until V-tail is displayed. This portion of your display will appear as follows:



## V-Tail Operation

- One servo must be used for each half of the ruddervator.
- Connect the left ruddervator servo to the elevator port (ELEV) of your receiver. Plug the right ruddervator servo into the rudder (RUDD) port of your receiver.
- Check to ensure that the servos move in the proper direction for both elevator and rudder inputs. If the servos are not moving in the proper manner (direction), use the Servo Reversing function, Code 11, to reverse the travel direction of the servo(s) that are not moving properly. Each servo's travel direction can be individually adjusted through Code 11. Refer to Section 8.1 of this manual for more information regarding servo travel direction.

- Once the servos achieve their proper travel direction, adjust their travel volume, dual rates and sub-trim.

**Note:** The applicable channel's travel adjustment may be made individually in Code 12, Travel Adjust. Refer to Section 8.2 of this manual for more information regarding the travel adjustment.

- Note that each servo's travel volume is automatically reduced to 75% of the operating range. This is to ensure that the servo does not operate beyond its travel limits. Failure to observe caution when adjusting the value for the ruddervator servos can result in damaged servos or worse! Please be careful.

**Note:** Fine adjustments of the V-tail servos should be made with the dual rate feature in high rate, Code 13. Refer to Section 8.3 of this manual for further information on the Dual Rate function.

- You can also adjust the neutral point of your ruddervator servos individually. To do so, use Code 15, Sub-Trim, as described in Section 8.5 of this manual.

**Note:** V-tail mixing is not available in the elevon wing type selection.

## Dual Elevator Mix

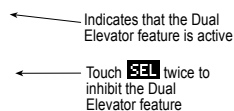
The 10X has a feature called dual elevator mix. This function is especially useful for large airplanes that use a separate servo for each elevator half.

To utilize this function, plug the servo that controls the right elevator half into the elevator socket in the receiver. The servo that controls the left elevator half should be plugged into the AUX 3 socket (channel 8) in the receiver. To access dual elevator, touch the SEL key under the tail until D/ELEV appears.

Follow the steps below to set up the elevator halves. This procedure will help to ensure that excessive sub-trim values are not used, while at the same time eliminating unwanted elevator differential throw.

1. Plug the right elevator servo into the ELEV port of the receiver and plug the left elevator servo into the AUX 3 port (channel 8) of the receiver.
2. While in the Wing Type Function (Code 22), press SEL under TAIL until D/ELEV appears. This selects the Dual Elevator feature.
3. Turn on the receiver and check the direction of travel of both elevator servos. If either or both servos are not traveling in the correct direction, use the REV. SW function (Code 11) to change the direction of the Elevator or AUX 3 (channel 8) channels to achieve the proper direction.
4. Perform the following to help minimize the sub-trim settings and to avoid differential throw in the elevators. Set the sub-trims for the ELEV and AUX 3 channels to zero using the Sub-Trim function (Code 15) and center the digital elevator trim on the transmitter. With the receiver and transmitter turned on, examine the two servos and notice if the servo arms are at 90° or perpendicular to the vertical stabilizer. Reinstall the arm if necessary to achieve as close to a perpendicular position as possible. Now use sub-trim to adjust the arms so they are perfectly perpendicular to the slab.
5. Adjust both elevator halves so that they are perfectly centered using the mechanical linkage.
6. Now adjust the overall travel of each elevator half using the Travel Adjust function (Code 12). Adjust the right elevator with the ELEV function in Travel Adjust in both the up and down directions. Now adjust the left elevator using the AUX.3 Travel Adjust to match the travel of the right elevator in both directions.

*Note: Once the right and left elevator throws have been synchronized, use the Trace Rate function (Code 14) to adjust the throw of both elevators simultaneously. The Trace Rate function eliminates the need to individually measure and adjust the throw of each servo when more than one channel is used for the elevator, aileron, or rudder.*



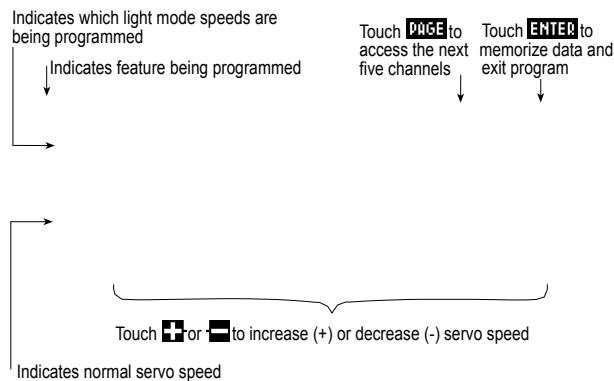
## Servo Speed

The purpose of the servo speed function is to allow the transit time of any of the ten available channels to be regulated from Normal speed down to 1° per second. This is useful for obtaining a scale landing gear retraction or scale gear door retraction, slowing down the throttle response or synchronizing control surface speeds, etc.

When the flight modes are activated, the servo speeds can be selected for each flight mode.

### Accessing and Utilizing the Servo Speed Function

To access the servo speed function, enter Code 24 in the code number access selection or use the direct mode method. Your screen will appear as follows:



To decrease servo speed, touch the - key below the corresponding channel. Note the value given is in degrees per second. Touch the + key to increase servo speed.

When the Flight Modes are active, the corresponding flight mode will appear at the upper left-hand corner of the screen. Touch the MODE key to access the other available flight modes and adjust the servo speed as desired for each flight mode.

**Note:** When the degrees per second are adjusted higher than the servos's inherent transit speed, the servo will rotate at its normal speed.

To access the remaining five channels, touch the PAGE key.

**Note:** If Flight Modes are inhibited in Code 17, only one servo speed is available for each of the 10 channels.

once the battery voltage alarm has sounded. For more information, please refer to Section 6.1 of this manual.

## Data Reset

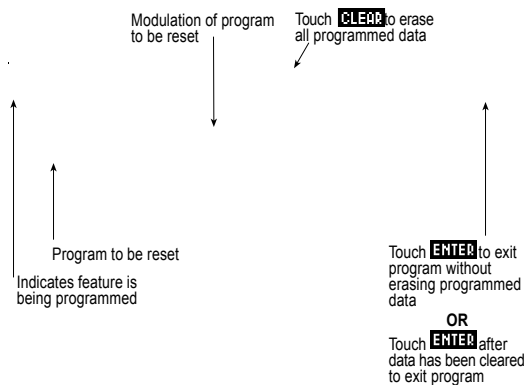
The Data Reset function enables the pilot to clear all of the data for a particular model from the transmitter memory. Once this feature has been used, all settings return to their factory default or preset positions and values.

**Note:** The only data that is cleared by the Data Reset function is the data for the model that currently appears on the LCD display. If you want to clear data from a different model, you must first access that model in Code 84, Model Select.

## Accessing and Utilizing the Data Reset Function

To access the Data Reset function, enter Code 28 in the code number access selection or use the direct mode method.

The screen will appear as follows:



If you change your mind, or have accessed the data reset program by mistake and do not wish to clear the model from the transmitter memory, simply touch the enter key prior to touching the clear key. The enter key allows you to exit the program and leave the model intact.

**Cautionary Note:** Once you have cleared the programmed data from a given model memory, you will not be able to change your mind and recall the cleared information.

To clear all data from a given model, simply touch the clear key. The screen will ask ARE YOUR SURE YOU WANT TO RESET MODEL XX? Touch YES to clear the model or touch NO to return to the previous screen. If you touch YES, all the data that you have entered will now be cleared and your radio will return to the factory default settings for that particular model.

**Note:** As part of the factory default settings, when the transmitter is cleared, the modulation automatically returns to S-series PCM. It is crucial to note which modulation is compatible with your receiver. Refer to Section 8.24, Modulation Select for more information on this subject.

To exit the program touch the ENTER key.

**Note:** You will be unable to access the Data Reset function

## Snap Roll

The snap roll function allows a pre-programmed position of the aileron, elevator and rudder to be selected at the press of the snap roll button.

In the normal mode with flight modes inactive, four snap rolls are available with the direction being set according to the position of the switches located on the back of the transmitter. With flight modes activated, the amount and direction of the snaps are programmed for each flight mode (the back panel switches are inhibited), allowing for a specified snap amount and direction for each flight mode.

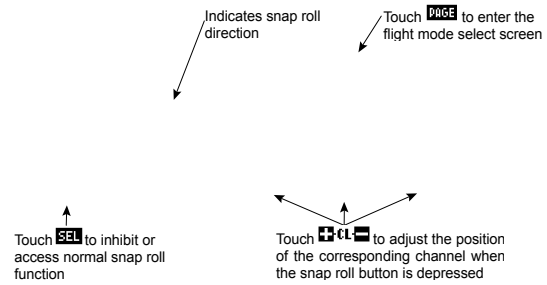
In normal mode with flight mode inactivated, enter Code 31, S. Roll and touch the ACT key once to activate the Snap Roll function.

The shaded block indicates the snap roll direction for which you are adjusting the travel values. In the example, our airplane would currently snap right and down. To change the snap roll direction, move the directional switches on the back of the transmitter to another position. The value below each channel indicates the position that each respective control surface will achieve when the snap button is depressed. This value can be adjusted up to 150%. If you choose to program another snap roll, simply move the back directional switches to the desired position.

**Note:** If you have never used a snap roll switch before, begin with a fairly high percentage for ailerons and moderate percentages for elevator and rudder. Perform snap rolls at reasonable air speeds to avoid damaging your air frame.

### Pre-Programming Snap Rolls to Flight Modes

With Flight Modes activated (Code 17, Function Select), the amount and direction of the snap roll can be programmed for each flight mode. For example, in FM 1 a rapid right positive snap roll can be chosen, while in flight in FM 2 a gentle outside (down) left snap can be programmed to automatically occur when the snap roll button is depressed, etc. Touch the SEL key until F.Mode appears below ACT in Snap Roll function, Code 31. **Note:** Flight modes must be activated in Function Select, Code 17.



The screen will appear as illustrated above and will be used to set the percentages of throw for each snap roll. However you must first go to the next screen to set the snap roll direction for each Flight Mode (FM-0 through FM-4) Press PAGE to go to the next screen, as illustrated below.

Each Flight Mode (FM-0 through FM-4) may be assigned one snap roll configuration. A snap roll configuration consists of a direction (RU, RD, LU, or LD) and a percentage of throw for the aileron, elevator and rudder.

**Note:** The Flight Mode Snap Roll feature is limited to two sets of throws in any one direction, such as RU. This is controlled by the P0 and P1 parameters.

If, for instance, the pilot would like a hard positive right snap (RU) associated with FM-0 where AILE = 120%, ELEV = 120% and RUDD = 120% and would like a soft positive right snap (RU) associated with FM-1 where AILE 70%, ELEV = 30%, and RUDD = 40%, one of the Flight Modes (FM-0 or FM-1) must be designated as P0, while the other is designated as P1. A third RU snap configuration with a third set of percentages that are different from the other two is not possible with the Flight Mode Snap Roll feature. However the two snap settings that are already programmed can be assigned to as many flight modes as desired.

1. Set the snap roll direction for each Flight Mode (FM-0 through FM-4) by touching the left SEL under each Flight Mode. Touching the left SEL will cycle through all of the directions (RU, RD, LU, LD).
2. Examine the direction that you have selected for each flight mode. If there are two or more Flight Modes that have the same direction and you wish to have different throws (percent-

ages) associated with the direction, proceed with Step 3 below. If you want the same throws associated with a direction that is specified more than once, go directly to Step 4 below.

3. In order to specify different throw for the same direction; touch the SEL key under the appropriate Flight Mode to indicate either P-0 or P-1. Remember there is a limit of two sets of throws for each direction. The Flight Modes designated as P-0 for a given direction will have one set of throws, while the Flight Modes designated as P-1 for the same direction will have another set of throws. Proceed to Step 4 below.
4. It's now time to set the throws (percentages) for the directions that have been established for each Flight Mode. Touch PAGE to return to the previous screen where the percentages are displayed and can be adjusted.
5. Set the Flight Mode switch to FM-0. Notice that the direction that was set for FM-0 on the previous screen is highlighted. Set the percentages of travel for the aileron, elevator and rudder using the + and - keys. These are now the settings for Flight Mode 0. Next move the Flight Mode switch to FM-1 and set the percentages in the same fashion as described above for FM-0. Repeat the process for FM-2 through FM-4.

## Gyro Gain Sensitivity System

The 10X features a sophisticated gyro gain sensitivity system that allows in-flight control of gyro gain for two separate gyros. It provides for standard gain adjustments (fixed gains), as well as Stick Priority Gyro Gain adjustment where gyro gain is progressively reduced as the stick is moved further off center. Stick priority is highly advantageous for controlling gyros in aerobatic aircraft.

Up to two gyros may be used to control two of the three primary flight controls (elevator, rudder or aileron). Typical aerobatic applications involve gyros on the rudder and/or elevator. Each gyro can have three different gains that are selectable via Flight Modes or the AUX 2 switch. The gains can be fixed or variable using the Stick Priority Gyro Gain feature.

**Note:** This function is designed to be used only with gyros that have in-flight proportional gain adjustment capability, such as JR's NEJ-900, and NEJ-3000 Piezo gyros. Single and dual rate gyros that use a potentiometer to adjust the gain will not work properly with this function.

### Connections

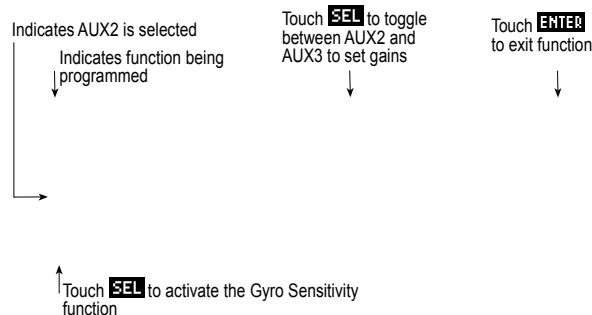
Plug the gain connector of the first gyro into the AUX2 port of the receiver. Plug the gain connector of the second gyro into the AUX3 of the receiver. If only one gyro is to be used, connect its gain to AUX2. If two gyros are to be used, be mindful of which control (rudder, elevator or aileron) is to be controlled by AUX 2 and which is to be controlled by AUX3 as you will need to know this later if Stick Priority Gyro Gain is achieved.

**Note:** Since the gain for the second gyro must be plugged into AUX3, it precludes using the Dual Elevator feature in Wing Type (Code 22) because dual elevator also uses AUX3. If the aircraft uses two elevator servos and you would also like to use two gyros, the two elevator servos must be connected through a Y-harness.

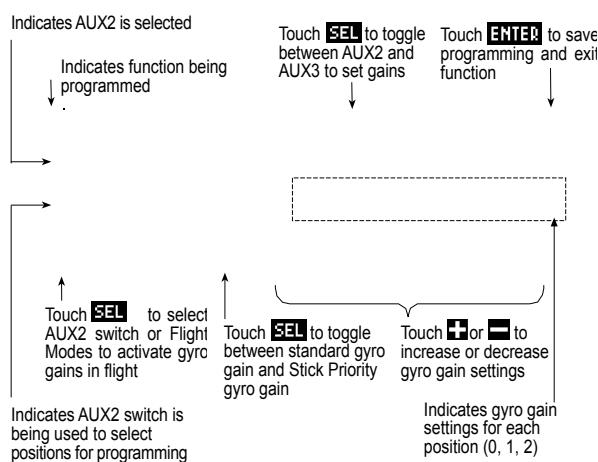
### Accessing Standard Gyro Gain Sensitivity

To access the standard gyro gain sensitivity feature (no stick priority), enter Code 44 in the code number access selection or use the direct mode method.

The screen will appear as follows:



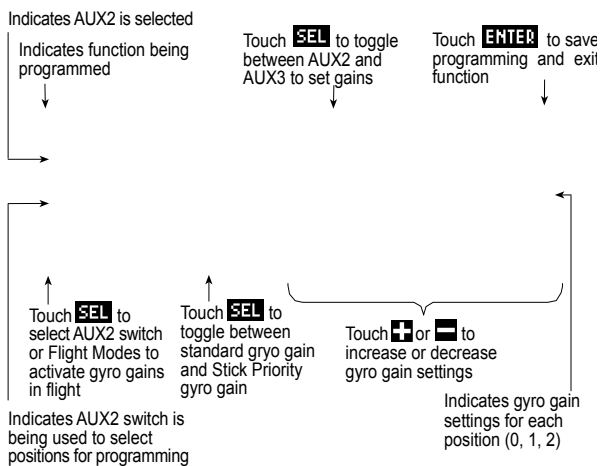
1. Touch the lower left SEL to activate the gyro sensitivity system and to obtain the following display:



2. Touch SEL at the top of the display until AUX2 is displayed and highlighted as shown. This indicates that the display is ready to accept gyro gain values for the gyro plugged into the AUX2 channel.
3. Touch SEL at the lower left of the screen until AUX2 appears under the highlighted AUX2. This indicates that the AUX2 switch will be used (at least for now) to select which gain position is to be programmed.

### Setting the Gain Percentages

In our example on the following page we have set the first position (Position 0) gain to 0%. This provides the ability to turn the gyro off in flight when this position is selected. Position 1 has been set to a moderate amount of gain (30%) and Position 2 has been set to a high percentage of gain (70%). We suggest that you program your system in the same manner until you become familiar with how everything works, then you can experiment on your own. (**Note:** The percentages will vary according to the instructions that come with the gyro and the particular model being flown.)



4. Use the AUX2 switch to select each of the three gyro gain positions (0, 1, 2). When the AUX2 switch is in the upper position, an arrow appears to the left of the first gyro gain position (Position 0) as indicated in the display above. Touch the + or - keys below the position to set the percentage of gain for this position.

*Note: It's a good idea to leave the first position equal to 0% for both gyros as it will provide the ability to turn the gyro gain completely off in the event that the gyro becomes over-sensitive.*

5. Put the AUX2 switch in the middle position (Position 1) and note that the arrow moves to the middle gain position on the display. Touch the + and - keys to adjust the gain setting for this switch position (use this position to set a moderate amount of gain). Finally, move the AUX2 switch to the lower position and set the gain for the third position (Position 2) by pressing the + and - keys. Use this last setting for the highest gain you intend to use without causing an over-sensitive condition in the gyro(s).

6. If a second gyro is to be used, touch SEL at the top of the screen until AUX3 appears and is highlighted at the left of the display. Now use the AUX2 switch to again select each of the three gain positions for the AUX3 channel and set them in the same manner as was done for the AUX2 above.

*Note: It's a good idea to leave the first position equal to 0% for both gyros as it will provide the ability to turn the gyro gain completely off in the event that the gyro becomes over-sensitive.*

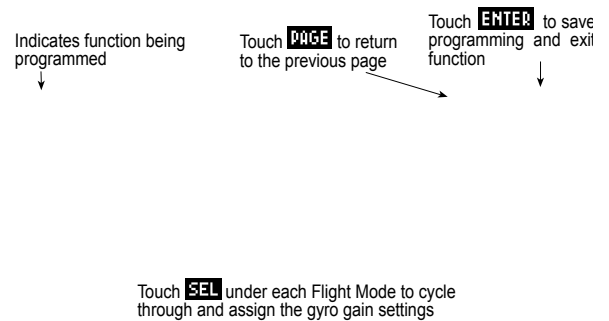
### Assigning Gyro Gains to AUX2 or Flight Modes

Gyro gains may be selected in flight by using the AUX2 switch, or they may be assigned to Flight Modes.

If you have performed the programming steps above, the system is already set up to use the AUX2 switch to select gyro gains in flight. If you want to use the AUX2 switch to select gyro gains, touch ENTER to save your programming and exit this function. When Flight Modes are activated in Code 17, any one of the three gyro gain settings can be activated in each Flight Mode (one gain setting per Flight Mode). To assign gain settings to Flight Modes,

follow the procedure below:

1. Touch SEL at the lower left until FM appears above SEL.
2. Touch PAGE and the screen below is displayed.

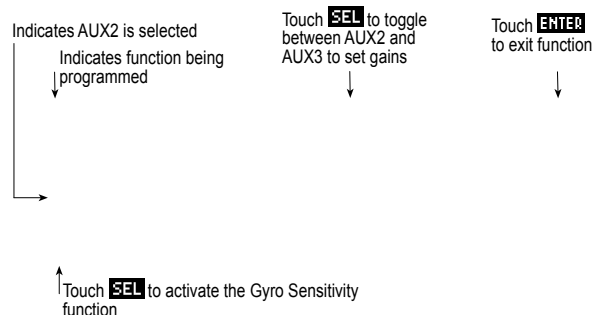


3. Touch SEL under each Flight Mode to select the gain setting (Position 0, 1, 2) for that Flight Mode. When a position is selected it represents the position for both gyros if more than one gyro is being used. For example, if Position 0 is selected for Flight Mode 1, the gains that were set for Position 0 for both gyros will be activated. In our example, we set position 0 to be 0% gyro gain, which in effect turns the gyros off. Therefore, selecting Position 0 for Flight Mode 1 would result in both gyros being turned off when Flight Mode 1 is selected.
4. Touch ENTER to save your programming and exit the function.

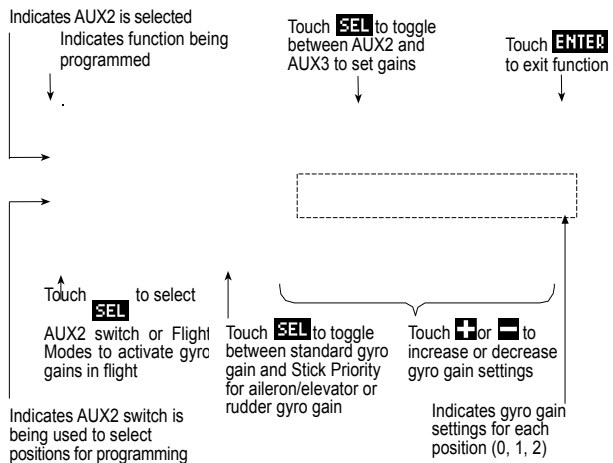
### Accessing the Stick Priority Gyro Gain Feature

Stick Priority Gain Control is very popular with aerobatic pilots as it allows the pilot to instantaneously override the gyro by moving the stick. Gyro gain decreases as the stick is moved further from neutral and it is typically set up so that gyro gain is reduced to zero when the stick is at full deflection. When the stick is released and allowed to center, gyro gain is instantaneously restored. In other words, the pilot assumes control of the channel by moving the stick and returns control of the channel to the gyro by releasing the stick. This facilitates performing excellent maneuvers, such as hammerheads and stall turns, as the gyro is overridden by the rudder stick in performing the pivot, but instantly dampens out any "wobble" as soon as the pivot is completed and the rudder stick is released.

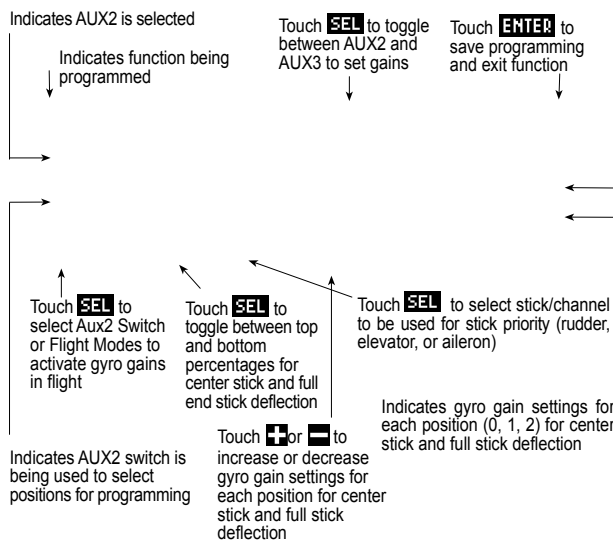
1. To access the Stick Priority Gyro Gain feature, enter Code 44 in the code number access selection or use the direct mode method.



2. Touch the lower left SEL to activate the gyro sensitivity system and to obtain the following display:



3. Touch SEL at the top of the display until AUX2 is displayed and highlighted as shown. This indicates that the display is ready to accept gyro gain values for the gyro plugged into the AUX2 channel (see display above).
4. Touch SEL at the lower left of the screen until AUX2 appears under the highlighted AUX2. This indicates that the AUX2 switch will be used (at least for now) to select which gain position is to be programmed (see display above).
5. Now touch SEL under CENT to activate Stick Priority Gyro Gain and the display will appear as illustrated below. Touch SEL again until the appropriate channel (AILE, ELEV, RUDD) appears.



A new row of gain percentages appears. The top row next to CENT indicates the gyro gain percentages that are in effect for AUX2 when the stick is centered. The bottom row indicates the gyro gain for AUX2 when the stick is fully deflected in either direction. In addition, END RUDD appears to indicate that the rudder stick is selected to control stick priority for the AUX2 channel.

In this example, notice that the first position (Position 0) is set to have a gain of 0% for both the CENT and END RUDD so that the gyro gain can be turned off completely. The second position (Position 1) CENT gain is set to 30% and its END RUDD is set to 0%. This will cause the gyro gain to be 30% when the stick is centered and will cause the gain to progressively decrease to 0 as the stick is fully deflected. The third position (Position 2) has been set to 70% for CENT and 0% for END RUDD — it has full gain when the stick is centered and no gain when the stick is fully deflected.

*Note: The END percentages are typically set to 0% to provide complete stick priority/override at full stick deflection.*

## Setting the Gain Percentages

6. Touch SEL under CENT until the proper control stick is displayed (rudder, elevator or aileron). It is the stick that corresponds to the control that is to be controlled by the gyro plugged into AUX2.
7. Use the AUX2 switch to select each of the three gyro gain positions (0, 1, 2). When the AUX2 switch is in the upper position, an arrow appears to the left of the first gyro gain position (Position 0) as indicated in the display above. Now touch SEL under END to select between the CENT percentage and end point percentage (END RUDD) and touch the + and - keys to set the percentage of each.

*Note: It's a good idea to leave the first position equal to 0% for both gyros as it will provide the ability to turn the gyro gain completely off in the event that the gyro becomes over-sensitive.*

8. Put the AUX2 switch in the middle position (Position 1) and note that the arrow moves to the middle gain position on the display. Now touch SEL and END to select between the CENT percentage and end point percentage (END RUDD) and touch the + or - keys to set the percentage of each (use this position to set a moderate amount of gain). Finally, move the AUX2 switch to the lower position and set the gain for the third position (Position 2). Use this last setting for the highest gain you intend to use without causing an over-sensitive condition in the gyro(s).
9. If a second gyro is used, touch SEL at the top of the screen to select the AUX3 gyro gain, and touch SEL under CENT to select the stick that corresponds with the control that is to be controlled by the AUX3 gyro. Now repeat the process above to set the CENT and end point gains for this gyro.
10. If you're going to use the AUX2 switch to select gyro gains in flight, touch ENTER to save the programming and exit the function. If you're going to assign gyro gains to Flight Modes, touch the lower left SEL until FM appears and then touch PAGE. Refer to the section on the preceding page on Assigning Gyro Gains to AUX2 or Flight Modes.

*Note: The stick priority mixing is a linear mix and the gain is reduced/increased in direct proportion to stick position.*

**Important Note:** Because of the travel limits built into most gyros with remotely adjustable gain, it will be necessary to reduce the Travel Adjust (Code 12) for the channel that's affected by the gyro in order to eliminate "dead band" from the control stick.

To do this: With the model turned on, access Code 12. Hold the control stick of the channel using the gyro to full left (or up in case of elevator) and reduce the travel adjust until the control surface begins to move. Then hold full right stick or elev and repeat this process. Normally the travel adjust will have to be in the 55% to 65% range to eliminate all stick dead band. Note that this does not reduce the overall travel of the servo, but simply recalibrates the travel adjust for use with the gyro.

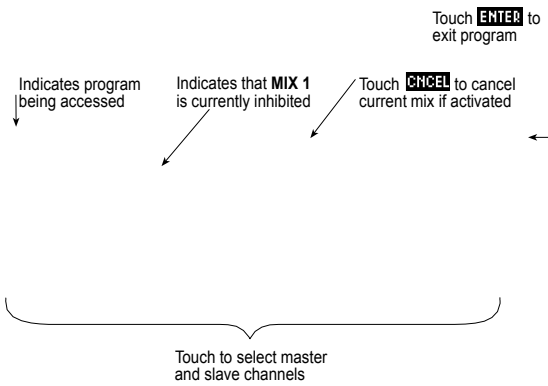
### Standard Programmable Mixing

The 10X provides five standard programmable mixes. Programmable mixes are used whenever the pilot wants a channel/servo to react or move as a result of providing input to another channel. The channel that reacts is called the Slave channel, while the channel that receives direct input is called the Master channel. Under this concept, when the pilot provides an input to the Master channel, the transmitter automatically generates an input for the Slave channel/servo so that it moves in a specified direction for a specified amount.

Mixes are programmable, allowing any of the 10 channels to be Master, Slave or both. The offset (mix neutral point), direction and travel can all be programmed and adjusted.

### Accessing and Utilizing the Standard Programmable Mixing Function

To access the Programmable Mixing function, enter the proper code, 51-55, in the code number access selection or use the direct mode method. The screen will appear as follows:



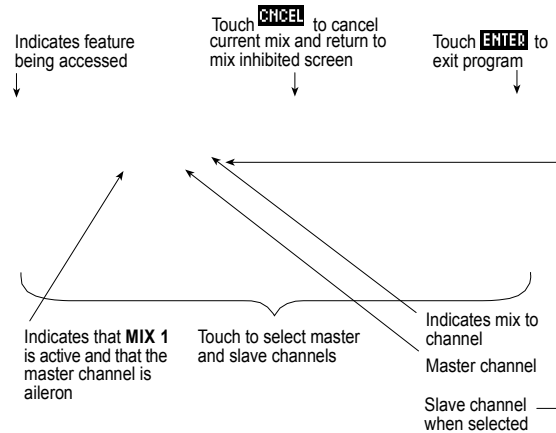
Each channel of your transmitter and receiver has been assigned a number for identification purposes. Use the following chart to identify the channel and its identification number.

Channel #	Receiver Channel	Complete Channel Name
1	THRO	Throttle
2	AILE	Aileron
3	ELEV	Elevator
4	RUDD	Rudder
5	GEAR	Gear/Retract
6	AUX1	Auxiliary 1 (flaps)
7	AUX2	Auxiliary 2
8	AUX3	Auxiliary 3
9	AUX4	Auxiliary 4
10	AUX5	Auxiliary 5

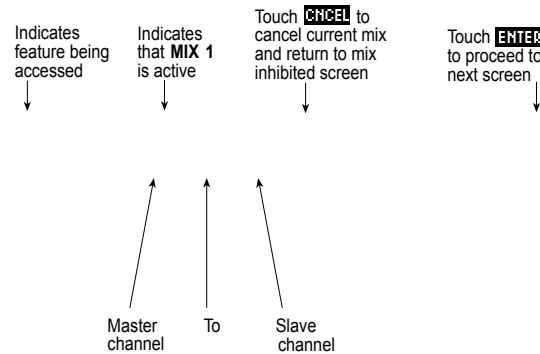
The first number key you select becomes the Master channel. It also activates the mix feature. The Master channel is the channel from which you want to mix. In other words, this is the controlling channel for the mixing feature.

The second number key selected becomes the Slave channel. The Slave channel is the channel that is being mixed into the Master channel. You can also think of it as the controlled channel for the mixing feature.

For example, you want to mix the aileron channel to the throttle channel. Aileron is the Master, or controlling, channel. Throttle is the Slave, or controlled, channel. The initial screen shows that the mixing feature is inhibited. However, after aileron is selected the screen will appear as follows:

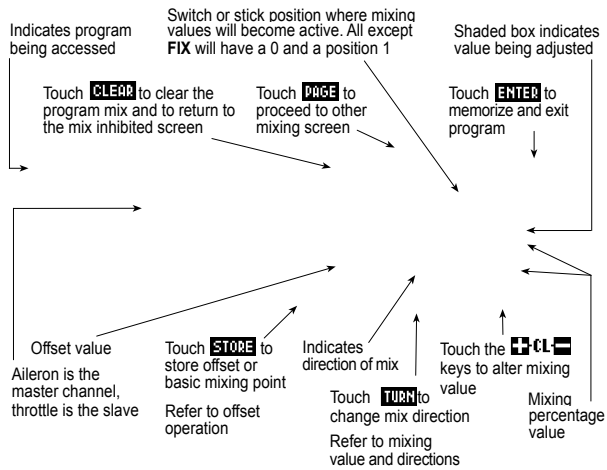


Next, choose the Slave channel—in our example, throttle. The screen will now change to display:



**Note:** Once both the Master and Slave channels have been selected, the channel numbers are removed from the bottom of the screen. If you have mistakenly entered a wrong channel number for either the Master or the Slave channels, touch the CANCEL key and reprogram the mixing channels.

After the Master and Slave channels have been selected, touch the ENTER key to advance to the next screen. Using our example, the screen will appear as follows:



## Offset Operation

Each programmable mix has a mixing offset. The purpose of this mixing offset is to redefine the neutral point of the Slave channel. Any position of the Master channel can be used as the offset, or reference point, for mixing. This is especially useful for channels that do not have a neutral point, such as the AUX 4 and 5 knobs' flap lever and AUX 3 lever, allowing you to use the program mix with respect to an arbitrary position.

The reference point is the position of the Master channel stick, or control switch, or lever where you select the mix value, as well as the direction of the mix. Using our example, AILE > THRO mix, the offset point is the center position of the aileron control stick. To select the offset value, position the Master control stick, switch lever, or potentiometer to the point you want as the offset position. Next, touch the STORE key located beneath the offset display. The offset value from center now replaces the 0 on the screen. This value may be either a positive number or a negative number, depending on the position of the Master channel.

## Mixing Value

Use the Master channel to change the location of the shaded box. In our example, moving the aileron stick to the right shades the lower box; moving the aileron stick to the left shades the upper box.

Once the shaded box highlights the value you want to adjust, use the + and - keys to adjust the value accordingly. The range is adjustable from  $\pm 100\%$ .

To increase the mixing value, touch the + key. Your value will begin to change accordingly.

To decrease the mixing value, touch the - key. Your value will decrease accordingly.

*Note: To achieve a negative value, refer to the mixing direction section that follows.*

To clear a mixing value, touch the CL key or the + and - keys simultaneously. Your highlighted value then returns to 0%.

## Mixing Direction

Mixing direction works in conjunction with the mixing value to achieve the correct percentage and direction of mixing.

Touch the TURN key to reverse the direction of the mixing. The mixing value remains the same and only the direction in the shaded box changes.

## Accessing Switch Position Functions

Mixing can be assigned to several flight modes or switches. To access the Switch Position function, press the PAGE key at the top right of the mixing screen. Your screen will appear as follows:

*Note: If you wish for this mix to always be on, adjust the desired mix value in Pos 0 and leave all switches in Position 0. Two mix values are available—Position 0 mix value and Position 1 mix value. If you desire an on/off setting, store the desired on values under 1 and leave the Pos 0 values at 0%. Then select the desired switch with which you wish to turn the mix on and off by touching SEL until Position 1 is selected.*

*Note: Position 1 always has priority over Position 0 such that if a switch or Flight Mode is assigned to POS1 and that Flight Mode or switch is activated, Position 1 mix values will be in effect.*

## Operating the Include and Origin Mixing Functions

These are accessed by pressing the PAGE key, or by touching the SEL key beneath MASTER, you can select from among the Normal, Include Mixing and Origin functions.

## Include Mixing

Include Mixing should be used whenever the pilot wants the Slave channel to always react to the Master, regardless of the source of input. If Include Mixing is not activated, it is possible for the Master channel to move without moving the Slave under certain circumstances.

For instance, if two channels are used for two rudders and a regular or multi-point mix is used to move the rudders in unison, it's important to activate Include Mixing to ensure that the Slaved rudder channel always moves with the Master rudder. If the rudder stick is moved, both rudders will move, even if Include Mixing is not active. However, the Slaved rudder will not move if input is received from a source other than the rudder stick, such as the snap roll button, or from another program mix, etc. Another way to describe Include Mixing is that it will cause the Slave channel to react to the Master channel at all times, regardless of where the input is initiated (stick, snap roll button, another programmable mix, etc.). It can also result in using fewer mixes in some instances.

An arrow will appear on the display to the left of the Master channel when Include Mixing is activated.

To illustrate how Include Mix can result in using fewer mixes, see the following example:

Mix1: AILE > THRO

Mix2: > THRO > RUDD

Mix2's operating value includes the operating value from Mix1's Master channel (aileron). By moving the aileron control stick, Mix1 has the ailerons mixing into the throttle. At the same time, Mix2 is mixing throttle into the rudder. Since Include Mixing is activated, you are also mixing your ailerons into the rudder. This results in the aileron stick moving not only the aileron servo, but also the throttle and rudder servos.

Include Mixing may sound complex, but it actually eliminates the need for a third mixing program to mix aileron and rudder channels. Therefore, Include Mixing reduces the number of mixing programs needed when using multiple mixing functions.

Touch the SEL key one more time to access the Origin Mixing function from the Include Mixing function.

## Origin Mixing

In order to understand Origin Mixing, it's necessary to first understand how Normal Mixing operates.

In Normal Mix, if the dual rate, exponential rate, VTR and/or trace rate value of the Master channel is assigned, it also affects the Slave channel. For example, if rudder is mixed to nose gear steering (AUX 4) and an expo value is assigned to the rudder, the nose wheel steering (AUX 4) will have the same expo value as the rudder.

Now using the same example (RUDD to AUX 4), let's turn on the Origin Mix and see what effect it has

With Origin Mix activated, D/R, Expo, VTR, or TR does not affect the Slave channel (AUX 4). The Slave channel keys directly off of the original stick, ignoring the "modifiers" that have been assigned to the Master. With Origin Mixing on, the rudder, dual rate, expo, etc., will have no effect on the nose wheel steering.

There is one other very important feature associated with Origin Mix. It is the ability to use a lever, switch, or knob to control other mixers, even when the lever, switch, or knob has been inhibited in Function Select (Code 17) or has otherwise been inhibited as the result of using a built-in function.

This is possible because Origin Mix instructs the transmitter to read and act upon only the physical position of the lever, switch, or knob (the control), and to disregard the channel that the control is normally associated with. The manner in which the transmitter reacts to the control is dependent upon what is set up in the program mixer.

This Origin Mix function can be demonstrated by a simple and practical example involving the Flap lever located on the left side of the transmitter and the Flaperon wing type that is typically used to control ailerons with two servos on two channels. Our example assumes that it is an aerobatic aircraft and as such, we don't need the ailerons to work as flaps—only as ailerons.

The factory default is to have the Flap lever assigned to the Flap channel (AUX1/FLAP). When the Flap lever is moved, it causes the Flap channel/servo to move. When we use the Flaperon wing type to control the ailerons with two servos/channels, we plug the left aileron into the Flap channel (AUX1/Flap). Since we don't want the ailerons to act as flaps, we Inhibit the Flap lever in Function Select (Code 17). At this point, the Flap lever no longer has any effect on the Flap channel—it has been disconnected—when the lever is moved, nothing happens.

The Flap lever is now free to be used for other purposes. Let's say we want to use it for an idle-up, where the Flap lever is used to increase the idle of our engine while flying, and then to reduce the idle when it is time to land. We can accomplish this using a program mixer; selecting the Flap channel (AUX1/FLAP) as the Master; selecting the throttle channel as the Slave; and turning on Origin Mix. If you are following along and wish to program this idle-up to the Flap lever, do the following:

1. Inhibit the Flap lever in Function Select (Code 17) if it is not already inhibited.
2. Access an unused program mixer (51–55).
3. Select Channel 6 (AUX1/FLAP) as the Master and select Channel 1 (throttle) as the Slave.
4. Touch PAGE two times and select Origin Mixing, telling the mixer to sense the Flap lever.
5. Touch PAGE again to get to the first mixer screen.
6. Move the Flap lever all of the way down.
7. Touch STORE to store the offset—this sets the mix starting point to the lever's lowest position so that the idle can only be increased and not accidentally decreased, which might kill the engine.
8. Touch the + key until the value reaches 15%—this limits the

idle up to 15% of throttle travel.

9. Turn the receiver on and check to see if the throttle moves in the correct direction—moving the Flap lever up should open the throttle slightly. If it is reversed, touch TURN to reverse the mix direction.

That's all there is to it!

Remember that this concept applies to all levers, switches, and knobs that are accessible in Function Select.

## Mixing With Trim

Whenever the Master channel is aileron, elevator, or rudder, you have the option of allowing the Master channel's trim lever to mix into the Slave channel. To activate trim mixing, touch the SEL key. The screen shows that this has been activated by displaying "on" below trim. You can observe the operation by watching the Slave channel, while moving the Master channel's trim lever.

*Note: If you have not yet entered values for the mixing percentages, the Slave channel will remain stationary. Also, if the mixing percentages are minute, the movement of the Slave channel from the trim lever is also minute.*

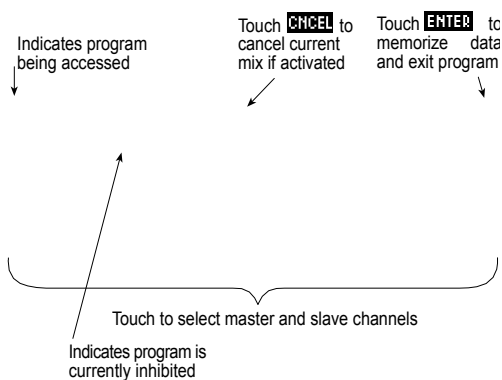
### Multi-Point Programmable Mixing

Multi-Point Mixing provides the ability to define a customized “curve” of travel that the Slave channel will follow as it reacts to the Master channel. It is different from Normal Mixing in the sense that Normal Mixing results in a form of linear movement of the Slave channel in relation to the Master. With Multi-Point Mixing you can define up to 8 points along the travel of the Master channel. Then for each defined point the amount and direction of the Slave can be set.

### Accessing and Utilizing the Multi-Point Programmable Mixing

To access the Multi-Point Programmable Mixing function, enter the proper code, 56-58, in the code number access selection or use the direct mode method.

The screen will appear as follows:



To select the Master and Slave channels, touch the appropriate channel number at the bottom of the screen. The first channel you touch will be the Master, the second the Slave.

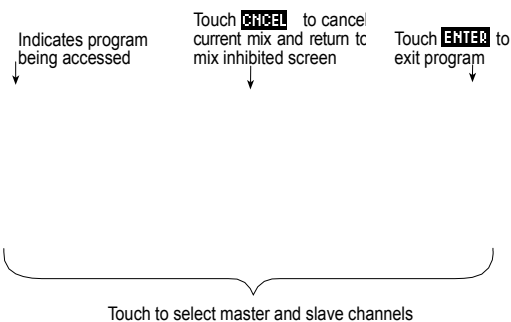
Each channel on your transmitter and receiver has been assigned a number for identification purposes. Use the chart on the next page to identify the channel and its identification number.

Channel #	Receiver Channel	Complete Channel Name
1	THRO	Throttle
2	AILE	Aileron
3	ELEV	Elevator
4	RUDD	Rudder
5	GEAR	Gear/Retract
6	AUX1	Auxiliary 1 (flaps)
7	AUX2	Auxiliary 2
8	AUX3	Auxiliary 3
9	AUX4	Auxiliary 4
10	AUX5	Auxiliary 5

The first number key you select becomes the Master channel. The Master channel is the channel from which you want to mix. In other words, this is the controlling channel for the mixing feature. The second number key selected becomes the Slave channel. The Slave channel is the channel that is being mixed into the Master channel. You can also think of it as the controlled channel for the mixing feature.

For example, you want to mix the rudder channel to the aileron channel. Rudder is the Master, or controlling, channel. Aileron is the Slave, or controlled, channel. The initial screen shows that the mixing feature is inhibited.

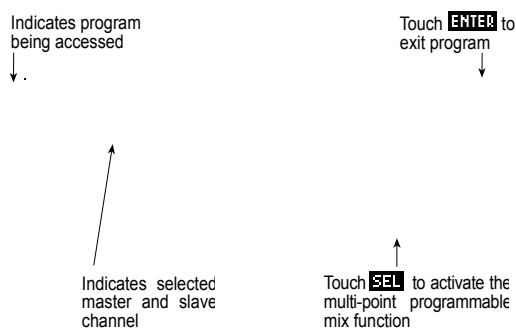
However, after rudder is selected, the screen will appear as follows:



Next choose the Slave channel by touching the corresponding channel number.

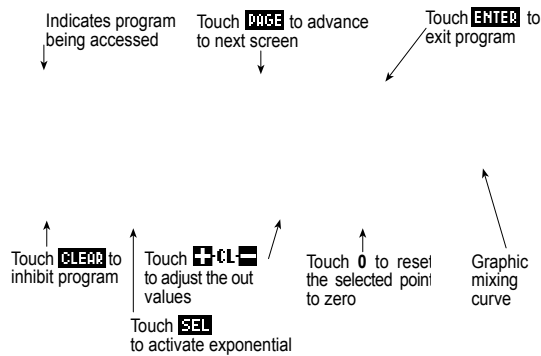
**Note:** Once both the Master and the Slave channel have been selected, the channel numbers are removed from the bottom of the screen. If you have mistakenly entered a wrong channel number for either the Master or the Slave channels, touch the CANCEL key to cancel the mix and reprogram the mixing channels.

After the Master and Slave channels have been selected, touch the ENTER key to advance to the next screen. Using our example, the screen will appear as follows:



**Note:** To select the Multi-Point Programmable Mixing function, touch the SEL key below TYPE until CURV appears. If norm is selected, standard programmable mixing is activated. Refer to the previous section, Standard Programmable Mixing, for the operation of this function.

If Multi-Point Programmable Mixing is desired, select CURV under TYPE and then touch ENTER. Your screen will appear as follows:



## Graphic Mixing Curve

The graphic mixing curve, located on the right side of your screen, illustrates the mixing curve and is a useful reference tool when adjusting or storing points. Up to 6 points can be stored at desired positions, and these points can be moved up and down to any desired position from 0 to 100%.

### Adding New Points

Any time the +CL- keys (at the bottom of the screen) are replaced by the STORE key on the LCD, you can set a new point on the curve. Move the Master channel stick and note the vertical line where the cursor is located can be moved to any desired position. To store a new point, move the Master channel stick to the desired position and touch STORE at the bottom of the screen. Up to 6 points can be programmed and a high point and low point are automatically entered into your transmitter.

### Clear Operation

When the display cursor indicates that the Master channel is in the position of a point that you wish to clear, you can push the CL key or the + and - key simultaneously to clear the desired point.

**Note:** Only this point will be cleared from the transmitter.

As a result of removing one point, the other point numbers change accordingly. Their values do not change, only their point number.

### In & Out

“In” refers to the actual stick position of your gimbal. “Out” refers to the actual position of the slave servo. The range for “out” is adjustable from -100 – +100. You are able to adjust the output value by pressing the + or - keys to increase/decrease the respective values. If you press either the CL or the + and - keys simultaneously, you will reset the output value to 0.

### Stick Position

This value is represented numerically just below the ENTER key and changes to show the current stick position. You may find this

useful when you want to move to the middle point position.

## Exponential Function

An Exponential function allows you to smooth the selected curve. Touch the SEL below the EXP to activate the exponential function.

Example screens:

EXPONENTIAL OFF

EXPONENTIAL ON

## Accessing Switch Position Functions

Mixing can be assigned to several flight modes or switches. To access the Switch Position function, press the PAGE key at the top right of the mixing screen. Your screen will appear as follows:

**Note:** If you wish for this mix to always be on, adjust the desired mix value in Pos 0 and leave all switches in Position 0. Two mix values are available—Position 0 mix value and Position 1 mix value. If you desire an on/off setting, store the desired on values under 1 and leave the Pos 0 values at 0%. Then select the desired switch with which you wish to turn the mix on and off by touching SEL until Position 1 is selected.

**Note:** Position 1 always has priority over Position 0 such that if a switch or Flight Mode is assigned to POS1 and that Flight Mode or switch is activated, Position 1 mix values will be in effect.

To access the Include and Origin Mixing, switch position and mixing with trim functions, press the PAGE key at the top center of the mixing screen. Your screen will appear as follows:

Press PAGE again and your screen appears as:

**Operating the Include and Origin Mixing Functions** By touching the SEL key beneath Master, you can select from among the Normal, Include Mixing and Origin Mixing functions.

### Include Mixing

Please refer to the description of Include Mixing on page 43.

### Origin Mixing

Please refer to the description of Origin Mixing on page 44.

### Mixing With Trim

Whenever the Master channel is aileron, elevator, rudder or throttle, you have the option of allowing the Master channel's trim lever to mix into the Slave channel. To activate trim mixing, touch the SEL key. The screen shows that this has been activated by displaying "on" below trim. You can observe the operation by watching the Slave channel, while moving the Master channel's trim lever.

*Note: If you have not yet entered values for the mixing percentages, the Slave channel will remain stationary. Also, if the mixing percentages are minute, the movement of the slave channel from the trim lever is also minute.*

## Practical Applications

### Multi-Point Programmable Mixes

The PCM-10XI aircraft system features 3 multi-point programmable mixes. Each of these programmable mixes allows up to 8 points to be selected and adjusted, including the low and high points. An example of a practical use for this function is as follows.

An aerobatic aircraft exhibits roll coupling with the application of rudder in knife edge. At 50% rudder input, very little roll coupling takes place, only 2% is required for correction. But at 75% rudder input, more roll coupling occurs and 8% is required for correction. And at 100% rudder, a lot of roll coupling occurs and 30% aileron correction is required to cancel out the roll coupling.

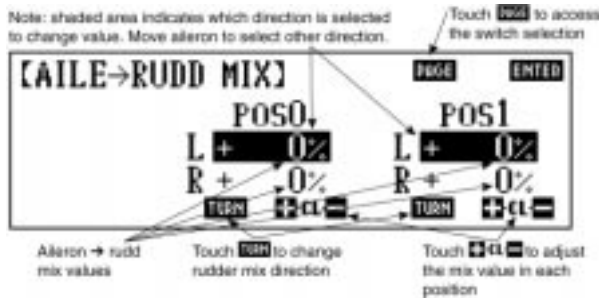
In this case, 7 total points would be needed, including the endpoints. The graph would look something like this:

An exponential function in each of these 3 multi-point programs "smooths the curve," eliminating abrupt servo response at each selected point. These mixes can be turned off or on with your choice of 8 different switch positions, as well as at a selected throttle point. It can also be programmed to be on at all times.

## Aileron-to-Rudder Mixing

Aileron-to-rudder mixing is useful for some airplanes to counteract adverse yaw effects. Adverse yaw is where a right aileron input causes left yaw.

Two rudder mix values are available and can be programmed to be automatically selected in any or all flight modes or by a desired switch.



The aileron-to-rudder mix values, Position 0 and Position 1, can be selected in flight modes or with various switches. Touch PAGE in Code 62, Aileron→Rudder Mix, to access the switch selections.

**Note:** When flight modes are activated, they replace the following switches:

FM0	☑	E-F
FM1	☑	M-D
FM2	☑	L-D
FM3	☑	MX
FM4	☑	AU

**Note:** POS1 has priority over POS0 such that if any switch or flight mode that's assigned to POS1 is turned on, the POS1 value will be in effect. For example, all flight modes are set to POS0, gear switch is set to POS1. When the gear switch is moved in the forward position, POS1 values will be in effect even though the flight mode that you are in is set to POS0.

**Note:** When flight modes are inactive, the following switch choices are available:

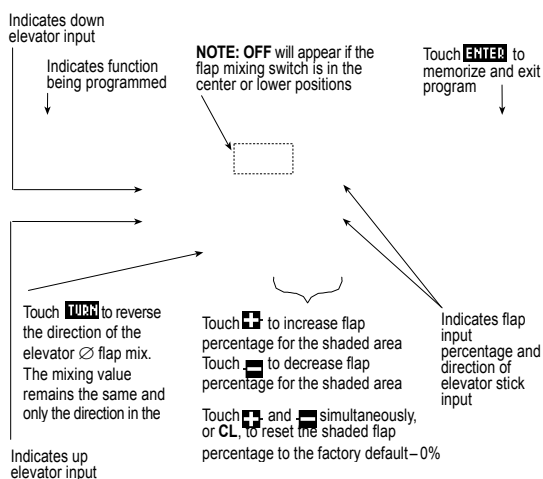
E-F	☑	ELEVATOR FLAP SWITCH UP POSITION
M-D	☑	ELEVATOR FLAP SWITCH MID POSITION
L-D	☑	ELEVATOR FLAP SWITCH DOWN POSITION
MX	☑	MIX SWITCH
AU	☑	AUX 2 UP POSITION
GR	☑	GEAR SWITCH
SNP	☑	SNAP ROLL BUTTON
STK	☑	SELECTABLE THROTTLE STICK POSITION

## Elevator-to-Flap Mixing

The uppermost position of the flap mixing switch activates the Elevator-to-Flap Mixing programming. When this system is active and a value for flaps is input, the flaps will be deflected each time the elevator stick is used. The actual flap movement is adjustable for both up and down elevator. The most frequently used application is up elevator/down flaps and down elevator/up flaps. When used in this manner, the aircraft pitches much more aggressively than normal.

### Accessing and Utilizing the Elevator-to-Flap Mixing Function

To access the Elevator-to-Flap Mixing function, enter Code 63 in the code number access selection, or use the direct mode method. The screen will appear as follows:



To adjust the mixing percentage, move the elevator stick in the desired position, up or down. Your shaded box follows the input. Use the + key to increase the percentage of flaps. The adjustable range is 0– + 100%. If you want to decrease the percentage of flaps, touch the - key. The adjustable range is from 0 – -100%.

If the flaps are moving opposite to the direction that you want, touch the TURN key. This reverses the mixing direction, giving you reverse throw, while still retaining the mixing value.

To clear the flap percentage for the shaded area, touch the CL key or the + and - keys simultaneously. The value in the shaded area returns to the factory default of 0%.

If you do not want to use the flaps independently, you may want to inhibit the flap lever in Code 17, Trimmer function.

Additionally, any trimming of the flaps can be accomplished through the Sub-Trim function, Code 15.

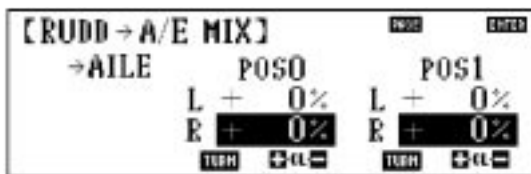
## Rudder-to-Aileron/Elevator Mixing

Rudder-to-Aileron and Rudder-to-Elevator Mixing is commonly used to correct roll and pitch coupling tendencies in aerobatic aircraft. With many airplanes, the application of rudder also causes the airplane to roll and pitch, as well as yaw, making such maneuvers as knife edge and point rolls difficult. Rudder-to-Aileron and Rudder-to-Elevator Mixing allows you to eliminate these rolling and pitching tendencies with rudder application.

### Accessing and Utilizing the Rudder-to-Aileron/Elevator Mixing

To access the Rudder-to-Aileron/Elevator Mixing, enter Code 64 in the code number access selection or use the direct mode method.

The Rudder-to-Aileron screen will appear as follows:



To adjust the mixing percentage, move the rudder stick in the desired direction. The shade box follows the input.

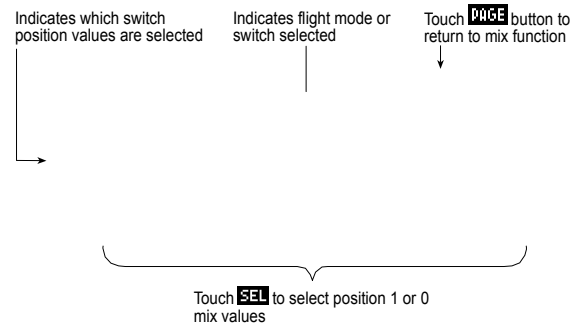
Use the + or - keys to adjust the mixing value. The adjustment range is from -100 – +100. Touch the TURN key to select a positive or negative value.

To clear the mix value, touch the CL key or the + or - keys simultaneously.

To access the Rudder-to-Elevator screen, press the PAGE key until the following screen appears. Follow the same procedure used in Rudder-to-Aileron Mix to set valves.

### Switch Selection

The Rudder-to-Aileron/Elevator mixing can be assigned to several flight modes or switches. Touch the PAGE key until the following screen appears.



**Note:** If you wish for this mix to always be on, adjust the desired mix value in Position 0 and leave all switches in Position 0.

Two mix values are available—Position 0 mix value and Position 1 mix value. If you want an on/off setting, store the desired “on” values under POS1 and leave the POS0 values at 0%. Then select the desired switch with which you wish to turn the mix on and off by touching SEL until Position 1 is selected.

**Note:** Position 1 always has priority over Position 0 such that if a switch or flight mode is assigned to POS1 and that flight mode or switch is activated, Position 1 mix values will be in effect.

## Practical Applications

### Rudder-to-Aileron/Elevator Mix Practical Application

Rudder-to-aileron/elevator mix is designed to eliminate unwanted rolling and pitching tendencies when rudder is applied. To utilize this feature, first trim your aircraft for straight and level flight. Now apply only right rudder and note any rolling tendencies. If the airplane rolls right (proverse roll), a left aileron mixing value must be programmed in Code 64. Adjust this value until no rolling coupling occurs. Now try left rudder and adjust the left rudder-to-aileron mix value until no rolling coupling occurs. Now roll left to knife edge and apply right rudder and note if the nose pitches up or down (relative to the aircraft). Adjust the rudder-to-elevator mix value accordingly. Roll to the opposite knife edge and do the same with left rudder. You may find that changing the rudder-to-elevator mix slightly affects the roll coupling and the rudder-to-aileron value may need to be slightly changed. However, if the model tends to pitch or roll couple in a non-linear fashion, Code 56-58 multipoint mixing can be used.

Note: Two values (POS 0 and POS 1) are available for rudder-to-aileron and rudder-to-elevator mix. To access these, touch PAGE and select the desired switch or flight mode.



## Flap System

The 10X features a three-position flap system with elevator compensation. Its purpose is to allow the flaps to be deployed in two positions normally, approximately 15 degrees down for takeoff and 45 degrees down for landing, but certainly other positions, including up, are available for special applications/maneuvers. An Auto Land feature is included that will automatically retract the flaps when the throttle is raised above a pre-programmed throttle position, which is helpful in the case of a missed landing attempt.

Because deploying flaps generally causes a pitch change, elevator compensation is provided that allows two pre-set trim changes of elevator when the flaps are deployed. The Flap System can be activated using the three-position flap switch or it can be assigned to flight modes.

### Accessing and Utilizing the Flap System

To access the Flap System, enter Code 66 in the code number access selection or use the direct mode method.

The screen will appear as follows:

*Note: When utilizing the Flap System, it's suggested that you inhibit the flap lever in Code 17, Function Select. Also in Code 17 you can choose to have the flap lever act as a flap trimmer or to be inhibited. See page 19, Code 17 Function Select, for more information.*

### Setting the Flap and Elevator Positions

To adjust flap and elevator to the desired position, first move the three-position flap switch to the mid or land position. Adjust the values of the selected position until the flaps and elevator are where you want them to be. The range is adjustable from +/- 0–125%.

*Note: The use of travel adjust and sub-trim can be used if a larger flap servo stroke is desired. Sub-trim must be used if a large stroke is needed so as to not overdrive the flap servo past its limits. This is necessary as the neutral or up position of the flaps is the centered position of the servo, so unless sub-trim is used to redefine the servos center, increasing travel adjust could overdrive the flap servo.*

## Flight Mode Select

The mid or land flap and elevator position can be programmed to automatically deploy in any of the five flight modes. With Flight Mode selected in Code 17, Function Select, touch the PAGE key in Code 66, Flap System, until the following screen appears:

*Note: If Flight Mode is not activated in Code 17, it will be impossible to access this screen.*

Touch the SEL key below each Flight Mode to select the desired flap position function. Four choices are available:

- 0 = Flap and elevator are in the normal neutral position and the three-position switch has no effect.
- FLAP = The three-position flap switch is active.
- MID = The flap and elevator are in the mid position and the three-position switch has no effect.
- LAND = The flap and elevator are in the land position and the three-position switch has no effect.

Select the desired function for each Flight Mode. If you choose for the three-position flap switch to be functional in all Flight Modes, then program FLAP under each Flight Mode.

### Auto Land

To store an Auto Land stick position, move the throttle stick to the desired position and touch STORE below the AUTO LAND on the left side of the screen. The stored position will be displayed and the flaps can only be deployed below that pre-set throttle stick position. If the flaps are deployed at low throttle and the throttle is raised above the pre-set position (missed landing approach), the flaps will be automatically raised to their up position.

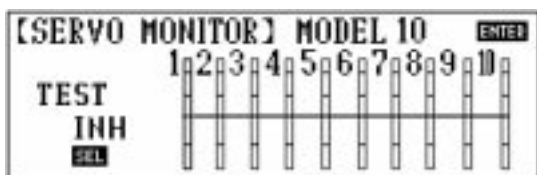
*Important Note: On some aircraft, lowering the flaps also reduces the stall speed (the minimum flight speed at which the aircraft can maintain flight). Raising the flaps at these slow speeds can cause a stall, thus resulting in a crash. It's important to test the Auto Land feature at a higher altitude, throttling up to see the effect of going from full flaps to raised flaps at slow speeds and seeing if any stall issues are encountered. The additional altitude will give you time to recover should a stall occur.*

## Servo Monitor

The Servo Monitor function allows you to visually examine each of the 10 channel's servo positions. This is extremely helpful when setting up complicated mixing or checking to be sure that a function is working properly in a flight mode. A servo test mode is also available in this function.

To access the Servo Monitor function, enter Code 75 in the code number access selection or use the direct mode method.

The screen will appear as follows:



### Servo Test (Slow/Step)

The Servo Test function enables you to see if any of your servos have developed any bad or worn spots on their potentiometers.

*Note: Prior to accessing the servo test function, remove all linkages from the servo. You do this because the servos travel their full range regardless of the travel values selected in the Travel Adjust function, Code 12.*

## Accessing and Utilizing the Servo Test Function

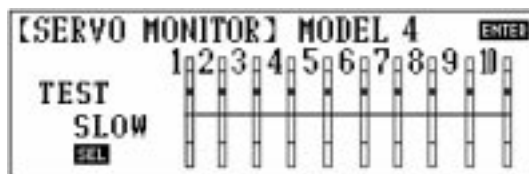
First, as just mentioned, it is imperative that you remove all linkages from the servos in your airplane. This enables the servo to travel its full range without any mechanical binding that could harm the servo and/or airplane.

After this has been completed, access the Servo Test Function by entering Code 75 at the code number access selection or using the direct mode method.

### Slow Servo Test

The servos immediately begin to slowly cycle through their travel ranges.

*Note: All servos move simultaneously. Your screen will appear as follows:*



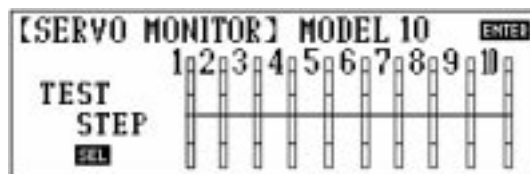
Observe each respective servo in your airplane for signs of unusual wear. Note that a servo with either a worn or bad potentiometer will jump or "jitter" as it moves across the weak area.

### Step Servo Test

You can access the Step Test at any time during the Servo Test function. To do so, touch the SEL key in the lower left portion of the LCD display.

Your screen will change to display the following:

*Note: The servos now move one at a time through the Step Test*



*mode. The feature begins with channel 1 (the throttle channel) and moves to channel 2, then channel 3 and so on. Each servo moves through four steps before going to the next servo.*

*Note: The 10X tests all channels, not just the ones you are using on your airplane. Therefore, you might notice a delay between servo testing. If AUX1 is the last channel used, there will be a delay of approximately 5–8 seconds before the throttle channel begins its step testing.*

Touch ENTER at any time to exit the Servo Test function.

## Fail-Safe/Hold

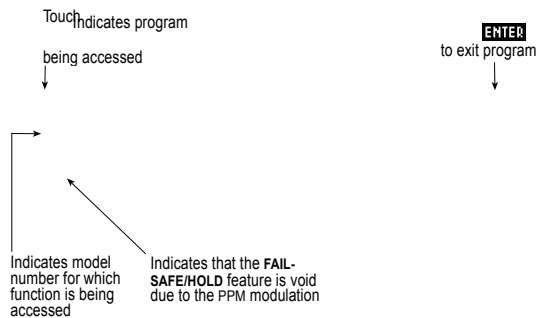
The Fail-Safe/Hold feature is available only when you use the transmitter in either of the PCM modulations — SPCM or ZPCM. These features are designed to help minimize the damage to your airplane during a loss of signal to the receiver. The servos either assume the fail-safe presets or hold their last good signal position.

**Accessing and Utilizing the Fail-Safe/Hold Feature** To access the Fail-Safe/Hold functions, enter Code 77 at the code number access selection or use the direct mode method.

*Note: Since the actual screen appearance varies, depending on the modulation of your radio, refer to the appropriate modulation section that follows.*

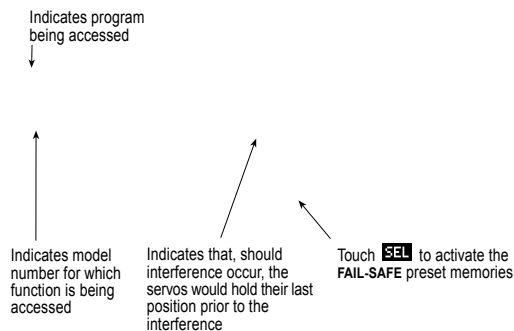
### PPM

As noted earlier, if you are in the PPM modulation, the Fail-Safe/Hold functions are not applicable. The screen will appear as follows:



### ZPCM Fail-Safe/Hold

The initial screen will appear as follows:



### Hold (Z PCM)

The Hold function is automatically activated when the radio is turned on and is in the ZPCM modulation.

This feature stops (or holds) the servos in the positions they were in just prior to the interference. Therefore, your airplane maintains the position held immediately before the interference was experienced. When a clear signal is restored, the Hold function releases, and control of the airplane returns to you.

### Fail-Safe (Z PCM)

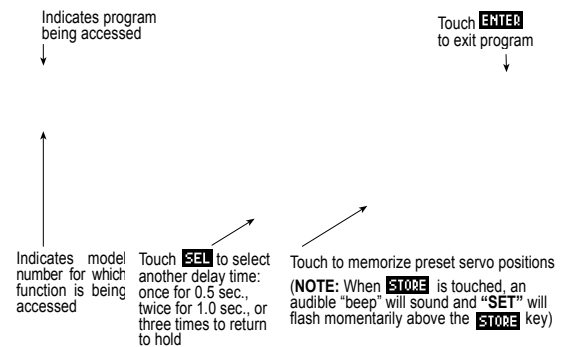
*Note: Fail-safe should always be set when the airplane engine is not running.*

When the Fail-Safe function is activated (i.e., the signal is interrupted), the receiver automatically moves each servo to a preset position. The position that each servo assumes is determined by you, as is the time length of the interference that must occur before servos move to their preset position.

After the interference has ceased, control of the airplane returns immediately to you.

There are three time delays to choose from: .25 sec, 0.5 sec, and 1.0 sec. These time delays are the amount of time it takes, starting the moment the interference occurs, until the servos assume their preset positions.

To select the preset servo positions and the time delay, access Code 77, as instructed earlier. From the Hold screen, simply touch the SEL key. The display will change to read as follows:



The first time delay that appears is the .25 second delay. If you want to select the 0.5 second delay, simply touch the SEL key one time. If you desire a 1.0 second delay before the servos assume their preset positions, touch the SEL key one more time—i.e., two times from the .25 second display.

To enter the preset servo positions you want, simply hold the sticks in the positions you want the servos to assume during signal loss conditions. You can determine fail-safe preset positions for the other channels of your airplane by placing the potentiometers and switch in the positions that you want them to assume

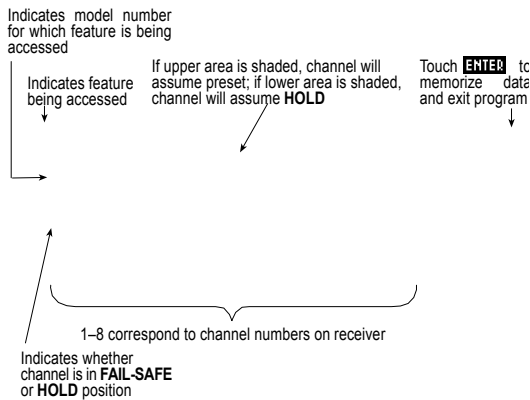
during interference. Next, touch the STORE key. While the STORE key is depressed, an audible beep sounds and “SET” flashes momentarily on the LCD display above the STORE key. Those stick, potentiometer and switch positions are now stored in the transmitter’s memory circuits, to be sent to the receiver’s memory automatically.

To verify the input of the fail-safe preset positions, turn the transmitter “off” while leaving the receiver’s power “on.” Observe the reactions of the servos. They should assume the positions that you entered with the STORE key.

**Note:** These preset positions remain stored in the transmitter’s memory until both the transmitter battery pack and the lithium back-up battery have been removed (or until Code 28, Data Reset, has been performed). Therefore, you do not have to reset each time you fly. Should you wish to adjust the fail-safe preset positions, simply access the Fail-Safe function once again and adjust the preset as you have just done. The transmitter automatically recalls the settings for the last fail-safe adjustment.

The fail-safe in the SPCM offers three types of fail-safe: Hold, fail-safe presets, or a combination of the first two.

## SPCM Hold



The Hold feature is automatically activated when the radio is turned “on” and in the SPCM modulation.

This feature stops (or holds) the servos in the positions that they were in just prior to the interference. When a clear signal is restored, the Hold function releases and control of the airplane returns you.

## SPCM Fail-Safe

Once the Fail-Safe function has been activated by signal interruption (interference), the receiver automatically moves the servos to a preset position. You determine the pre-determined servo positions. In the SPCM Fail-Safe, the time delay (the amount of time it takes, starting the moment the interference occurs, until the servos assume the preset positions) is fixed at .25 or 1/4 second. After the interference has ceased, normal operation of the airplane returns to you immediately.

**Note:** Auxiliary channels 4 and 5 cannot be preset for fail-safe positions. These channels (9 and 10, respectively, on the receiver) hold the position of their last good signal from the transmitter.

To select the servos that will return to the preset positions, access Code 77 as instructed earlier. Press the numerical keys corresponding to channels 1-8 on the receiver. (Refer to Section 3.1, Channel Assignment, to determine functions correlating to channel numbers.)

When the STORE key is depressed, an audible beep sounds and SET flashes momentarily on the LCD display above the STORE key. The stick and switch positions are now stored in the transmitter’s memory circuits, to be sent to the receiver’s memory automatically.

To verify the input of the fail-safe preset positions, turn the transmitter “off” while leaving the receiver’s power on. Observe the reactions of the servos. They should assume the positions that you entered with the STORE key.

**Note:** These preset positions remain stored in the transmitter’s memory until both the transmitter battery pack and the lithium back-up battery have been removed (or until Code 28, Data Reset, has been performed). Therefore, you do not have to reset the fail-safe each time you fly. Should you want to adjust the fail-safe preset positions, simply access the Fail-Safe function once again and adjust the presets as you have just done. The transmitter automatically recalls the settings for the latest fail-safe adjustment.

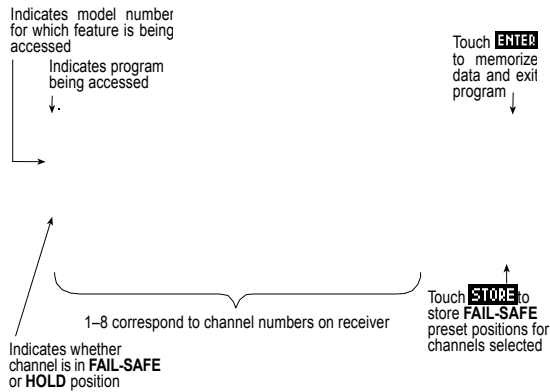
## Combination Fail-Safe and Hold (S PCM)

The 10X also allows you to combine the Hold and Fail-Safe presets for the first eight (8) channels on the receiver—you can select Fail-Safe or Hold independently for channels 1-8 on the aircraft. In other words, some channels will hold their last clear signal position, while others assume a preset position.

For example, if you want channels 1, 3, 5 and 7 to maintain a hold position, while channels 2, 4, 6 and 8 assume a preset position, touch the numbers 2, 4, 6 and 8 on the fail-safe screen. The LCD should read as follows:

**Note:** Channels 1, 3, 5 and 7 were not touched (as is exhibited by the location of the shaded boxes corresponding to the channel numbers) and automatically hold their last clear signal.

Once any channel is designated for a fail-safe preset, your screen will change to display the following:



*Note: In the above example, only channel 1, throttle, has been designated so far for fail-safe preset. You can observe this by noting that the shaded portion of the box is in the upper or fail-safe position.*

To enter the preset servo positions you want, simply place the levers (AUX1 and AUX3), switches (AUX2 and retracts) and the gimbal sticks in the positions you want the servos to assume during signal loss conditions. Next, touch the STORE key. The STORE key appears whenever any channel has been selected for fail-safe, instead of hold signal, position.

In the previous example, channels 2, 4, 6 and 8 were touched (as is exhibited by the location of their shaded boxes) and need to have preset positions input accordingly.

To select a preset fail-safe position, place the lever(s), switch(es) and/or gimbal sticks in the positions you want the servos to assume during signal loss conditions. Next, touch the STORE key. The STORE key appears whenever any channel is selected for fail-safe. When the STORE key is depressed, an audible beep sounds and SET flashes momentarily on the LCD display above the STORE key.

The switch positions and/or stick positions are now stored in the transmitter's memory circuit, to be sent automatically to the receiver's memory.

To verify the input of the applicable fail-safe presets, turn the power switch of the transmitter "off," while leaving the receiver's power "on." Observe the reactions of the servos. The channels that have been selected for fail-safe preset positions now assume those positions, while the other channels hold their last clear signal position.

*Note: These preset positions remain stored in the transmitter's memory until both the transmitter battery pack and the lithium back-up battery have been removed (or until Code 28, Data Reset, has been performed). Therefore, you do not have to reset the fail-safe each time you fly. Should you want to adjust the fail-safe preset positions, simply access the Fail-Safe function once again and adjust the presets as you have just done. The transmitter automatically recalls the settings for the latest fail-safe adjustment.*

## Pilot Link

The Pilot Link is a unique feature that allows the 10X to be hooked to another JR transmitter and, when the snap roll button is depressed on the 10X, the other transmitter has control of the aileron, elevator, rudder and throttle only, while the “Master” 10X retains all other functions, such as rates, flaps, trims, mixes, etc.

This feature allows the pilot of a very sophisticated aircraft to “buddy box” with another pilot, allowing him to try the aircraft without having to learn complicated switch positions or making it necessary to match the internal programming of the Master transmitter.

This feature also allows two pilots to fly one aircraft—one pilot handles the primary flight controls while the other handles the technical aspect (e.g., mixture, flaps, rates, trims, mixes, etc.). This is helpful when test flying complex aircraft.

To access Pilot Link, enter Code 78 in the code number access selection or use the direct mode method.

The screen will appear as follows:

Touch **ENTER**  
to the function  
mode screen ↓

Touch **SEL** to select  
master or slave ←

## Using the 10X as a Master

Touch SEL until MASTER appears on the screen.

## Slave Radio Set Up

### If the slave radio is a computer radio:

1. Select a model memory that's not being used and reset that memory to the factory default.
2. Now set the modulation to PPM.
3. Center all the trim levers (aileron, elevator, throttle, rudder).

### If the slave radio is an analog radio:

1. Set all the reversing switches to normal.
2. Center all the trim levers (aileron, elevator, throttle, rudder).

### If the slave radio is a 10SxII or a 10X:

1. Access Pilot Link, Code 78, and touch the SEL key until the screen reads SLAVE.
2. With the Slave radio turned off and the Master 10X turned on, connect the two radios using an optional trainer cord in the DSC jack.

Now, when the snap roll button on the Master 10X is depressed, the Slave radio will have control of the primary controls (aileron, elevator, rudder, throttle), while the Master has full control of all other functions.

Releasing the snap button will return full control to the Master.

*Note: When Pilot Link is active, the INFO screen will display the Pilot Link mode that's activated.*

*Note: Once the Pilot Link function is activated, the DSC function will not operate. To use the DSC function, the Pilot Link function must be inhibited temporarily.*

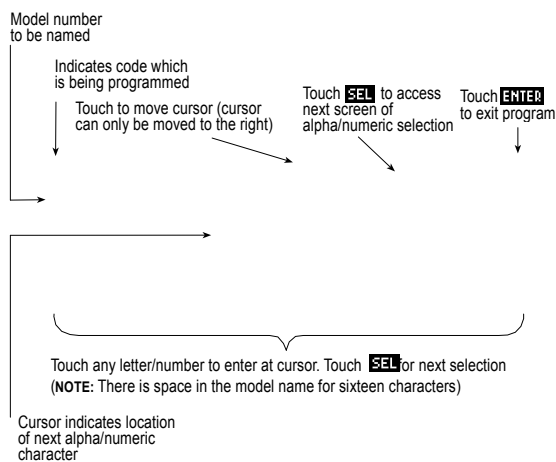
## Model Name Input

This function is used to name each model in the memory of your transmitter, making it very convenient to change from one airplane to another. You may also want to list the frequency of each airplane should you use more than one frequency between models. This helps prevent frustration at the flying field.


### Accessing and Utilizing the Model Name Function

To access the Model Name function, enter Code 81 in the code number access selection or use the direct mode method.

Your screen will appear as follows:



**Note:** There is space in the model name for 16 letters or numbers from the alpha numeric selections.

The vertical arrow serves as the cursor and indicates the position of the next letter or number to be entered. To create a space between numbers and/or letters, simply touch the horizontal arrow  or touch the SEL key until you see the blank space and touch this key.

To enter a number or letter, use the SEL key until the desired number/letter appears, then press the number/letter. It will appear in the indicated position.

**Note:** The cursor automatically moves to the next entry position. To correct a character that is entered in error, press the horizontal arrow until the cursor is under the character to be corrected and select a replacement character.

Touch the next letter or number until the model naming process is complete.

Touch ENTER to memorize the model name and to exit this program.

**Note:** The model name (and frequency, if entered) appears on the initial screen each time the 10X is turned on.

**Note:** If Code 28, Data Reset, has been used, the model name is also reset.

## Digital Trims and Trim Rate Adjustment

The 10X features digital trims on aileron, elevator, and rudder and a mechanical trim on throttle. Digital trim positions are automatically stored in memory for each model, and it's not necessary to manually store trim positions as it was with previous generations of JR 10-channel radios. Furthermore, independent digital trims in each flight mode can be selected ( see FM Trim, Code 17, page 19). Each digital trim has a trim rate feature that is adjustable from 1 to 10. This allows the amount of trim movement for each step of trim to be altered from very fine (setting of 1, one click of trim moves the servo very little, which is useful for ultra-fine tuning of an aircraft) to very course (setting of 10, one click of trim moves the servo a large distance, which is useful when first trimming out an airplane).

**Note about digital trim rates:** *It's important to understand that the total trim travel (the total amount of servo travel available with the digital trim lever) does not change when the digital trim rate is changed and remains at approximately 30 degrees. Only the distance between steps (resolution) is altered when the trim rate value is changed.*

**Note about mechanical throttle trim rate:** *The mechanical throttle trim rate is adjustable from 0-100%. Adjustments made to the throttle trim rate affect both the total servo travel available with the throttle trim lever (approximately 0 to 30 degrees) and the servo travel between each click of trim (resolution).*

Features of the digital trims:


- The digital trims emit a loud beep each time the trim is moved.
- When the trim neutral position is reached, a distinctive high pitched beep is emitted, audibly indicating that the center position has been reached, and the trim travel will pause for a short period of time.
- When holding the digital trim continuously and the center position is reached, a high pitched beep is emitted and a slight delay (approximately 1/2 second) will occur, allowing you time to release the trim at the exact neutral if desired.
- The pitch of the beep changes from right to left/ up to down (right is a low pitched tone, while left is a high pitched tone; up is a low pitched tone and down is a high pitched tone). This allows the pilot to audibly approximate the trim position during flight without having to look at the transmitter.
- The digital trims feature automatic dual speed scrolling. If the trim is held, the speed at which the trim changes will start at a slow rate then increases to a more rapid rate in approximately 3 seconds.
- A distinct higher pitched beep is emitted at the extremes of trim travel, indicating the trim end point has been reached.
- When Flight Modes are active, individual trim settings for each Flight Mode are available and are automatically memorized for each Flight Mode. See page 19, Code 17 FM Trim.

## Digital Trim Display

On the initial info screen, the trim position can be displayed on a bar graph or as a digital value for reference. To select the bar graph or digital trim values, touch the SEL key on the initial info screen (see below).

## Accessing and Utilizing the Trim Rate Feature

Touch **SEL** to select the bar graph or digital trim values for the digital trim settings




To access the Trim Rate feature, enter Code 83 in the code number access selection or use the direct mode method.

Your screen will appear as follows:


**Note:** *The factory default settings for digital trim rates are*

Touch **ENTER** to return to function mode



Touch the **+** or **-** to increase or decrease the total trim throw and distance between each step for the throttle servo

Touch the **+** or **-** to increase or decrease the trim rate (1 to 10) (step distributed between each click of trim) for that respective channel



*four, while the default settings for the throttle trim is 100%. If, after flying your model, you find that the trim rate needs to be altered, simply access the Trim Rate function as described above. Next, touch the + or - keys under each channel to achieve the desired trim rate. Touch CL to return to the factory setting of four for digital trims or 100% for mechanical trim.*

After completion of the trim rate selection, press the ENTER key to exit the program.

## Model Selection (1-10)

This transmitter allows you to program settings for ten (10) different airplanes into its memory. It also allows you to copy the data from one airplane program to another model memory.

Use the Model Selection function to select a model in memory and to copy data from one model to another.

### Accessing and Utilizing the Model Selection Function

To access the Model Selection function, enter Code 84 in the code number access selection or use the direct mode method. The screen will appear as follows:

### Model Selection

Five models are displayed on the screen.

To select different models, simply touch the **key** to scroll to the model you wish to access. To access models 6 through 10, simply continue to scroll through the model with the **key** or **key**.

Touch the ENTER key to select the current model number and name (if applicable) displayed on the LCD display.

*Note: If the servos do not respond to the control inputs after model selection is completed, check the frequency in both the transmitter and receiver to ensure that they are in agreement. If they are, check the Modulation, Code 85. Refer to Modulation*

### Copy Function

This Copy function allows you to transfer all data from the current model to another model memory of your choice.

*Note: This function is only for use when copying models from one model memory to another model memory within the same transmitter. To copy one of your model's settings into a different 10X airplane radio, refer to Code 86, Data Transfer.*

After accessing the Model Select function, select the model you want to copy the data from. To do so, refer to the Model Select section above. However, after selecting the "from" model, do not

touch the ENTER key. Instead, touch the COPY key. Your screen will change to:

After entering the copy screen, proceed to select the destination or "to" model. To do so, simply touch the + or - keys at the bottom of the LCD screen. That is, if you accidentally select Model 1 as the destination model, but do not want to copy over the existing data, select Model 2, 3, etc., by touching the + or - keys on the bottom of the LCD screen.

*Note: This is one instance where the naming of your models in Code 81, Model Name, will assist you in avoiding errors in the selection of models.*

If you change your mind and do not wish to transfer the "from" model data to any other model memory within your transmitter, you can simply copy it to itself without losing anything.

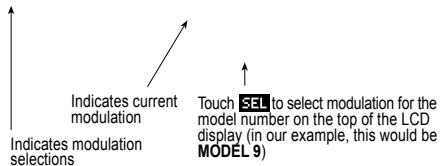
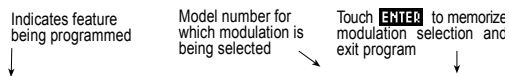
## Modulation Selection

This Modulation Selection function enables your 10X to transmit to a variety of JR receivers that are already or may soon be in existence. You can select from either of two types of PCM, ZPCM or SPCM, depending on the central processing unit within your receiver. Or you can select PPM (pulse position modulation). Refer to the receiver compatibility chart for the correct modulation.

### Accessing and Utilizing the Modulation Selection Function

To access the Modulation Selection function, enter Code 85 at the code number access selection or use the direct mode method.

The screen will display:



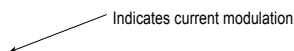
The type of modulation currently being used appears above the SEL key on the display screen. To change modulation types, touch the SEL key.

**Note:** Any time Code 28, Data Reset, is used, the 10X reverts back to the factory default of SPCM.

**Note:** The modulation selection process takes place immediately. There is no need for the power switch to be turned off.

To exit the Modulation Selection function, touch the ENTER key after selecting the proper modulation.

If you want to verify the modulation of your transmitter at any time, simply return to the initial info screen. The screen below appears:



## Receiver Compatibility Chart

Tx Modulation	Compatible Rx	# of Channels & Brief Description
PPM	NER-226	6 (micro)
PPM	NER-228	8
PPM	NER-327x	7
PPM	NER-527x	7 (micro)
PPM	NER-529x	9 (micro)
PPM	NER-549x	9 (micro)
ZPCM	NER-236	6 (micro)
ZPCM	NER-627XZ or 627 "G" series	7
ZPCM	NER-J329P	9
ZPCM	NER-910XZ	10
SPCM	NER-649S	9
SPCM	NER-940	10
SPCM	NER-950	10

**Note:** The 10X cannot be used with the NER-627x, NER-629x or the NER-J229p receivers. The central processing units (or CPUs) are not compatible.

## Data Transfer

The Data Transfer function is used to transmit and receive model memory between two 10X airplane transmitters or when storing programming memory to a personal computer with the DataSafe. (See the instructions included with the DataSafe for details on its use.)

This data is transferred, and therefore received, one model at a time. You may determine which model number is transferred, as well as the model number it will be assigned on the receiving transmitter. The program is so designed to prevent the receiving radio from accidentally erasing current models.

**Note:** The Data Transfer function is only applicable between two 10X airplane radios or the DataSafe. The data transfer functions properly regardless of differences in stick configuration (mode), frequency, etc., between the two transmitters. If data transfer is attempted between a 10X heli radio and a 10X airplane radio, or a PCM10s or PCM10Sx and a 10X, a warning message appears on the receiving side of the transfer.

**Note:** In order to perform the Data Transfer function, you need to obtain a JR trainer cord (JRPA130).

### Accessing and Utilizing the Data Transfer Function

Prior to accessing the Data Transfer function, prepare the transmit radio.

### Preparing the Transmit Radio

The power switch must be in the “off” position.

Insert one end of the JR trainer cord into the Direct Servo Control (DSC) port located in the rear of the transmitter. The pilot lamps will not glow as they do when the power switch is on. However, the LCD will be visible. The screen will appear as follows:

Touch **SEL** to select the bar graph or digital trim values for the digital trim settings

For a complete description of this screen, please refer to Section 7, Data Input.

**Note:** The significance of this screen is that it indicates the current model number and name (if applicable). The 10X only transmits the current model number and name as displayed. Therefore,

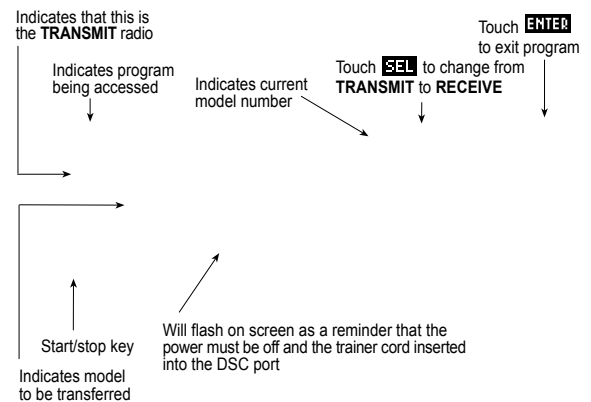
if this is not the model you wish to transfer to the receiving radio, access Code 84, Model Select, to recall the desired model for data transfer. You can use the code number access selection or the direct mode method, as if the radio were in the “on” position. Refer to section 8.24 in this manual for further information on the Model Select feature.

The transmit radio is now ready to access the Data Transfer function.

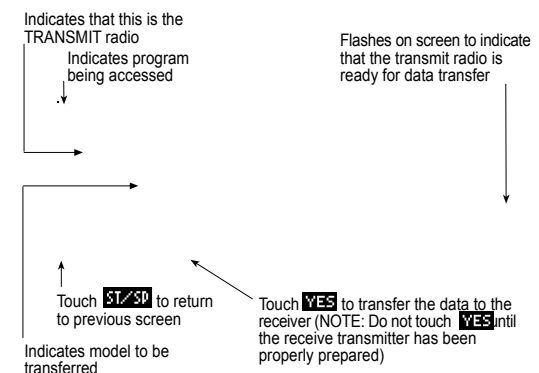
### To Access the Data Transfer Function

**Note:** If the battery voltage alarm has sounded, you will be unable to access the Data Transfer function. For more information on the battery voltage alarm, refer to Section 6.1, Alarm and Error Display, of this manual.

Enter Code 86 in the code number access selection or use the direct mode method. The screen will appear as follows:



Touch the ST/SP key at this time. This completes the preparation of the transmit radio for the time being and advances you to the transmit standby screen that should appear as follows:



Now begin preparation of the receiving transmitter.

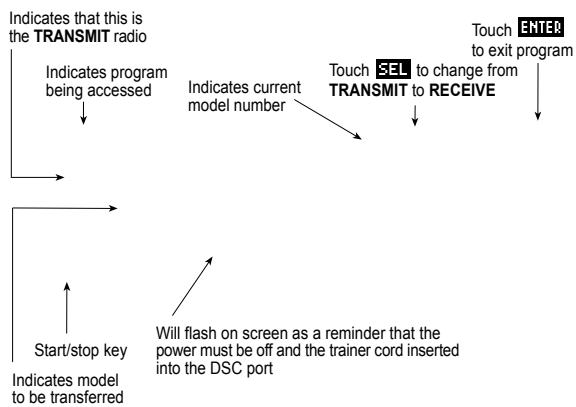
## Preparing the Receiving Transmitter

The power switch must be in the “off” position.

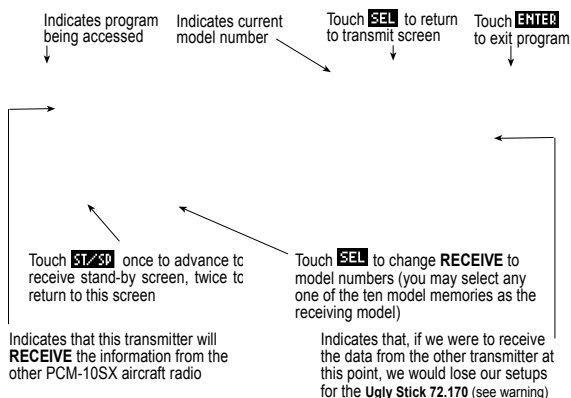
Insert the other end of the JR trainer cord into the Direct Servo Control (DSC) port located in the rear of the transmitter. The pilot lamps will not glow as they do when the power switch is “on.” However, the LCD will be visible. The initial screen that appears is the same screen as appeared at the transmit side. Unlike the transmit side, however, you can select the receive model after you have accessed the Data Transfer function.

**Note:** If the battery voltage alarm has sounded, you will be unable to access the Data Transfer function. For more information on the battery alarm, refer to Section 6.1, Alarm and Error Display, of this manual.

To access the Data Transfer function, enter Code 86 in the code number access selection or use the direct mode method. The screen will appear as follows:



Touch the SEL key in the upper right hand side of the LCD screen. Your radio changes from the transmit to the receiver radio at this point. The LCD screen will change accordingly.

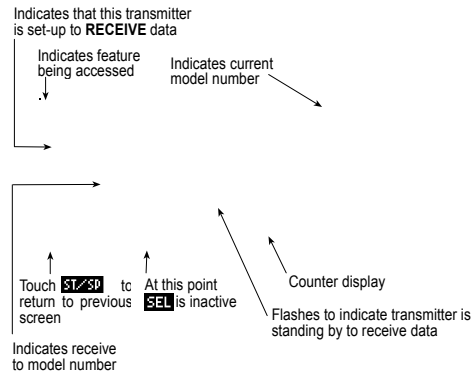


The “receive-to” model is indicated directly above the blinking “CONNECT DSC & POWER OFF” display. If you want to transfer data to the indicated model, press the ST/SP key to advance to the receive standby screen. If the receive-to model is in use and you do not want to erase it, you can select a different receive-to

model at this time. To do so, press the SEL key until a model memory that is not in use appears.

**Note:** It is important that you select a “receive-to” model that is either not programmed or one that you no longer wish to use. After a model has been received-to, you will be unable to call up the previous model memory for that model number.

Once you have chosen a receive-to model memory, touch the ST/SP key to advance to the receive standby screen. The screen will appear as follows:



You are now ready to proceed with the actual transfer of data. Your screen should appear as follows:

Next, press the YES key on the transmit radio. At this point, you will see both transmitter’s reactions simultaneously.



*Note: If you have copied another pilot's program for his radio controlled airplane, for the purpose of flying your own airplane, be sure to familiarize yourself with all the set-ups. The receiving model receives all data, modulation, servo travel direction, end points (ATV), etc., from the transmit model. Failure to check operation with your airplane may result in a crash.*

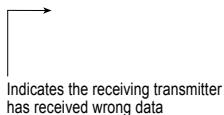
## Data Transfer Warnings

When the Data Transfer function is not working properly, the counter display stops functioning. At this time, press the ST/SP key and stop the transfer. Check to ensure that all DSC connections are properly fastened and that one radio is set up to transmit data. If you cannot locate the problem, remove the trainer cord from both systems and start the Data Transfer function again from the beginning.

Even if the counter display has decreased to 0 and faded out, there is a safety indicator to detect an error in the receive data. This display will read as follows on the receive model:

This screen indicates that data transfer has not occurred properly. Check to see if the trainer cord is properly inserted. Also, check to see if the cord itself is functioning properly. Remove all kinks and bends in the wire. If you cannot locate the difficulty, remove the transfer cord from both systems and begin the Data Transfer function once again.

The other warning will appear as follows:



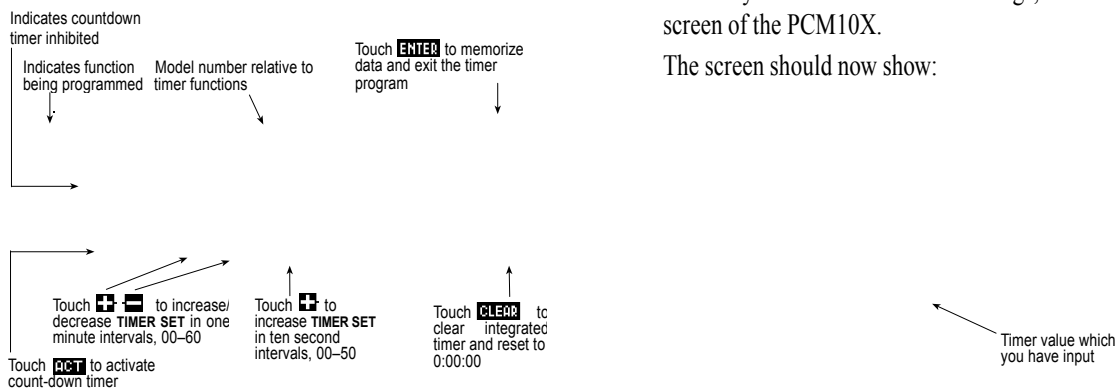
This indicates that the receiving model has received improper data, e.g., transfer of data from a 10X heli to a 10X airplane radio. This type of transfer of data cannot be done.

## Timer

The 10X has both an integrated timer and a count-down timing feature. The integrated timer serves as an up-timer, displaying the accumulated transmitter on time for each model in the transmitter's memory. The count-down feature is used as a stopwatch for timed flights.

### Accessing the Integrated Timing Function

To access the Integrated Timing function, enter Code 87 at the code number access selection or use the direct mode method. The screen will display:

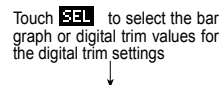


## Integrated Timer

The integrated timer displays the total time the transmitter has been on for each model. After 60 hours, the integrated timer automatically resets to 0:00:00. There are two screens where the integrated timer can be viewed:

- 1) in Code 87, timer function, as mentioned previously, and
- 2) in the initial display screen.

This screen will appear as follows:



While you are in the Timer function, you can reset the integrated timer by pressing the CL key. The timer returns to 0:00:00 momentarily and begins counting once again.

*Note: The timer also resets if Code 28, Data Reset, has been used.*

## The Count-Down Timer

This is the left-half of the screen. To activate the count-down timing feature, touch the ACT key. Your display changes to show that it has been activated.

To adjust the time for the count-down timer, press the + and/or - keys. From left to right on the timer display they: 1) add minutes to the timer in one (1) minute intervals up to 60 minutes,

2) subtract minutes from the timer in one (1) minute intervals to 00 minutes,

3) add seconds to the timer in ten (10) second increments up to 50 seconds.

Once the count-down timer has been set to the proper time, press the ENTER key to memorize the settings and exit the program.

To view your count-down timer settings, return to the initial screen of the PCM10X.

The screen should now show:

*Note: If the count-down timer is left at 0:00, zero, and active, you may use it as a stopwatch or count-up timer.*

## Use of the Count-Down Timer

Touch the ST/SP key to start or stop the count-down timer. This also serves to activate the stopwatch when the timer is set to 0:00, zero.

Touch the CL key to reset the count-down timer to the pre-selected time.

During the count-down, the timer beeps twice at each minute until it reaches the 30 seconds remaining mark, when it beeps three times. At each ten (10) second interval afterwards, it beeps twice until it reaches the final ten (10) seconds. It then beeps once for each second until zero (0) time remains, when it sounds one long beep. Once the timer has reached the zero, the display shows + to the right side of the time count. It then begins to count upwards as elapsed time.

## Keyboard Lock

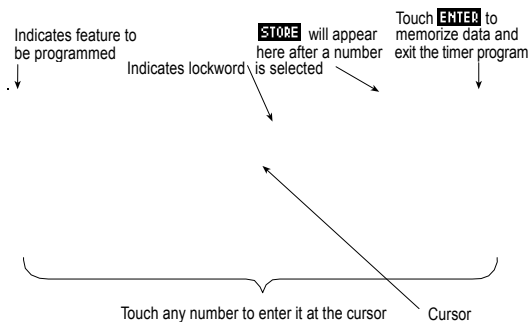
The Keyboard Lock function enables you to enter a three digit code, so that your model settings are safe-guarded against curiosity seekers who may tamper with your radio. This code can be reset and stored as often as you like.

*Note: Please write down your lock code and keep it someplace safe. If you forget your code, the transmitter has to be sent to Horizon's service department to be unlocked.*

### Accessing and Utilizing the Keyboard Lock Function

To access the Keyboard Lock function, enter Code 88 at the code number access selection or use the direct mode method.

The display will show as follows:



After you have accessed the Keyboard Lock function, an arrow appears on the display screen under the first of three numbers. This arrow serves as the cursor for your lock code selection. Determine your three number lock code and touch the corresponding numbers on the bottom of the LCD screen to enter them.

*Note: The cursor automatically advances to the next position after a number is selected.*

Touch the STORE key (that appears after the first numerical selection) to store the selected lock code in the 10X's memory. Touch ENTER to exit the program.

If you want to remove the lock word at a later date, access the Keyboard Lock function, Code 88, and enter 000 as the lock code.

Once the lock code is entered into the transmitter's memory, each time you turn the transmitter on and touch ENTER to access the Function Mode, the display will change to:

At this point, enter your lock code on the keypad at the bottom of the LCD display. As you enter numbers, an asterisk appears between the < > in the corresponding position. If you have entered the correct code, the display changes to the code number access selection screen. If you have not entered the proper code, the 10X will not let you proceed any further.

# 9

## Battery Charging

### 9.1

#### Transmitter/Receiver

*Note: It is imperative that you fully charge both the transmitter and the receiver battery packs prior to each flight. To do so, leave the charger and batteries hooked up overnight (16 hours). The first charge should be approximately 20–24 hours in order to fully charge both battery packs to peak capacity.*

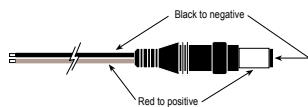
The charger supplied with this system is designed to recharge your batteries at a rate of 50 mAh for the transmitter and 120 mAh for the receiver battery pack.

#### Transmitter Only

The center pin on all JR remote control systems transmitter charge jacks is negative. Therefore, the center pin on all JR transmitter chargers is negative, not positive. This is different from many other manufacturers' chargers and radio systems. Beware of improper connections based on "color coded" wire leads, as they do not apply in this instance. You must make certain that the center pin of your JR transmitter is always connected to the negative voltage for correct polarity hookup.

*Note: Please refer to the following diagrams:*

Charger Pigtail for Transmitter



Charger Pigtail to Receiver



Red=positive  
Brown=negative  
Orange=signal

Please note this is different than transmitter charge polarity.

### 9.2

#### Charger

The pilot lamps should always be "on" during the charging operation. If not, check to make sure that both the transmitter and receiver are switched "off."

Do not use the charger for equipment other than JR. The charging plug polarity may not be the same and equipment damage can result.

During the charging operation, the charger's temperature is slightly elevated. This is normal.

Be sure to use the proper charger (120mAh) when using battery packs of 1000mAh or larger for your receivers.

# 10

## Servo Precautions

- Do not lubricate servo gears or motors.
- Do not overload retract servos during retracted or extended conditions. Make sure they are allowed to travel their full deflection.
- Make sure that all servos move freely through their rotations and that no linkages hang-up or bind. A binding control linkage can cause a servo to draw excessive current. A stalled servo can drain a battery pack in a matter of minutes.
- Correct any control surface “buzz” or “flutter” as soon as it is noticed in flight, as this condition can destroy the model. It is extremely dangerous to ignore such “buzz” or “flutter.”

*Note: Coreless servos (all servos in the thousand series from JR, e.g., 8231, 4721, 4131, etc., are coreless) make a slight buzzing noise even at the center position. This is normal and is caused by the motor constantly locking on its center position.*

- Use the supplied rubber grommets and brass servo eyelets when mounting your servos. Do not overtighten the servo mounting screws as this negates the dampening effect of the rubber grommets.
- Be sure that the servo arm is securely fastened to the servo.
- Check all related mounting screws and linkages frequently. Vibrations may loosen the linkages and/or screws.

# 11

## General Notes

Radio controlled models are a great source of pleasure.

Unfortunately, they can also pose a potential hazard if not maintained and operated properly. It is imperative that you install your radio control system correctly. Additionally, your level of piloting competency must be high enough to ensure that you are able to control your aircraft under all conditions. If you are a newcomer to radio control flying, please seek help from an experienced pilot or your local hobby shop.

Listed below are some safety precautions that must be followed by all pilots:

- Make sure that your batteries have been properly charged prior to initial flight and check the state of charge of your batteries between flights.
- Perform a range check prior to the initial flight of the day. See Section 13, Daily Flight Checks, for information on how to do so.
- Check all control surfaces prior to each takeoff.
- Do not fly your model near spectators, parking areas, or at any other place that could result in injury to people or damage to property.
- Do not fly during adverse weather conditions. Poor visibility can cause disorientation and loss of control of your aircraft. Strong winds can cause similar problems.
- Do not fly unless your frequency is clear. Warning: Only one transmitter at a time can operate on a given frequency. If you should turn on your transmitter while someone else is operating a model on your frequency, both pilots will lose control of their models. Only one person can use a given frequency at a time. It does not matter if it is AM, FM or PCM—only one frequency at a time.
- Do not take chances. If at any time during flight you observe any erratic or abnormal operation, land immediately and do not resume flight until the cause of the problem has been ascertained and corrected.

# 12

## Federal Aviation Administration

1. Purpose: This advisory outlines safety standards for operations of model aircraft. We encourage voluntary compliance with these standards.
2. Background: Attention has been drawn to the increase in model aircraft operation. There is a need for added caution when operating radio controlled models in order to avoid creating a noise nuisance or a potential hazard to full-scale aircraft and persons and/or property on the surface.
3. Operating Standards: Modelers generally are concerned with safety and exercise good judgment when flying model aircraft. However, in the interest of safer skies, we encourage operators of radio controlled models to comply with the following standards:
  - a. Exercise vigilance in locating full-scale aircraft (get help if possible) so as not to create a collision hazard.
  - b. Select an operating site at sufficient distance from populated areas so you do not create a noise problem or a potential hazard.
  - c. Do not fly higher than 400 feet above the surface.
  - d. Always operate more than three miles from the boundary of an airport unless you are given permission to be closer by the appropriate air traffic control facility in the case of an airport for which a control zone has been designated or by the airport manager in the case of other airports.
  - e. Do not hesitate to ask for assistance in complying with these guidelines at the airport traffic control tower or air route traffic control center nearest the site of your proposed operation.

Director, Air Traffic Service Federal Aviation Administration,  
Washington, D.C.

# 13

## Daily Flight Checks

1. Check all hardware (linkages, screws, nuts, bolts) prior to each day's flight. Be sure that binding does not occur and that everything is properly secured.
2. Be sure that all surfaces are moving in the proper manner.
3. Perform a range check before each day's flying session. The range check should be as follows:
  - Install the antenna on your PCM10X transmitter. Do not extend the transmitter antenna at this time. Turn the transmitter "on."
  - Turn the model "on."
  - Slowly walk away from the model while moving the control surfaces. The aircraft should function properly at a distance of 60 feet.
4. Check to be sure that all servo plugs and switch harness plugs are secured in the receiver. Also, make certain that the switch moves completely in both directions.

# 14

## Frequency Chart

72 MHz requires no special license to operate.

50/53 MHz requires the operator to have an FCC amateur radio license (Ham).

72MHz				50 MHz	
Ch. No.	Frequency	Ch.No.	Frequency	Ch.No.	Frequency
15	72.090	39	72.570		
16	72.110	40	72.590	00	50.800
17	72.130	41	72.610	01	50.820
18	72.150	42	72.630	02	50.840
19	72.170	43	72.650	03	50.860
20	72.190	44	72.670	04	50.880
21	72.210	45	72.690	05	50.900
22	72.230	46	72.710	06	50.920
23	72.250	47	72.730	07	50.940
24	72.270	48	72.750	08	50.960
25	72.290	49	72.770	09	50.980
26	72.310	50	72.790		
27	72.330	51	72.810		
28	72.350	52	72.830		
29	72.370	53	72.850		
30	72.390	54	72.870		
31	72.410	55	72.890		
32	72.430	56	72.910		
33	72.450	57	72.930		
34	72.470	58	72.950		
35	72.490	59	72.970		
38	72.550	60	72.990		
53 MHz					
Ch. No.	Frequency	Flag Color	Ch. No.	Frequency	Flag Color
A1	53.100	Black/Brown	A6	53.600	Black/Blue
A2	53.200	Black/Red	A7	53.700	Black/Purple
A3	53.300	Black/Orange	A8	53.800	Black/Gray
A4	53.400	Black/Yellow			
A5	53.500	Black/Green			

Note: Channels 11–14 are not available from JR.

**Important Note:** Be sure to keep your original, dated sales receipt in a safe place as you will be required to provide proof-of-purchase date for the equipment to be serviced under warranty.

## Warranty Coverage

Your new JR Remote Control Radio System is warranted to the original purchaser against manufacturer defects in material and workmanship for 365 days from the date of purchase. During this period, HORIZON SERVICE CENTER will repair or replace, at our discretion, any component that is found to be factory defective, at no cost to the purchaser. This warranty is limited to the original purchaser of the unit and is not transferable.

This warranty does not apply to any unit which has been improperly installed, mishandled, abused, or damaged in a crash, or to any unit which has been repaired or altered by any unauthorized agencies. Under no circumstances will the buyer be entitled to consequential or incidental damages. This limited warranty gives you specific legal rights; you also have other rights which may vary from state to state. As with all fine electronic equipment, do not subject your radio system to extreme temperatures, humidity or moisture. Do not leave it in direct sunlight for long periods of time.

## Repair Service Directions

In the event that your JR radio needs service, please follow the instructions listed below:

1. Check all on/off switches to be sure they are off. This will speed the repair process of checking battery condition.
2. Return your system components only (transmitter, receiver, servos, etc.) Do not return your system installed in a model aircraft.

3. Preferably, use the original carton/packaging (molded foam container), or equivalent, to ship your system. Do not use the system carton itself as a shipping carton. You should package the system carton within a sturdy shipping container using additional packing material to safeguard against damage during transit. Include complete name and address information inside the carton, as well as clearly writing it on the outer label/return address area.
4. Include detailed information explaining your operation of the system and problem(s) encountered. Provide an itemized list of equipment enclosed and identify any particular area/function which may better assist our technicians in addressing your concerns. Date your correspondence, and be sure your complete name and address appear on this enclosure.
5. Include your name, mailing address, and a phone number where you can be reached during the business day.
6. **Warranty Repairs.** To receive warranty service, you must include your original, dated sales receipt to verify your proof-of-purchase date. Providing that warranty conditions have been met, your radio will be repaired without charge.
7. **Normal Non-Warranty Repairs.** Should your repair cost exceed 50% of the retail purchase cost, you will be provided with an estimate advising you of your options.

Within your letter, advise us of the credit card you prefer to use. HORIZON SERVICE CENTER accepts VISA or MasterCard. Please include your card number and expiration date. The HORIZON SERVICE CENTER also accepts money orders.

Mail your system to:

**Horizon Service Center**  
**4105 Fieldstone Road**  
**Champaign, IL 61822**  
**Phone: (217) 355-9511**  
**[www.horizonhobby.com](http://www.horizonhobby.com)**

**AIRPLANE**

	THRO	AILE	ELEV	RUDD	GEAR	FLAP	AUX2	AUX3	AUX4	AUX5
REVERSE SW (11)	R≠N	R≠N	R≠N	R≠N	R≠N	R≠N	R≠N	R≠N	R≠N	R≠N
TRAVEL ADJUST (12)	H %	L %	D %	L %	+ %	+ %	+ %	+ %	+ %	+ %
	L %	R %	U %	R %	- %	- %	- %	- %	- %	- %
SUB-TRIM (15)										
SERVO SPEED 24	FM-0	N≠ ¥	N≠ ¥	N≠ ¥	N≠ ¥	N≠ ¥	N≠ ¥	N≠ ¥	N≠ ¥	N≠ ¥
	FM-1	N≠ ¥	N≠ ¥	N≠ ¥	N≠ ¥	N≠ ¥	N* ¥	N≠ ¥	N≠ ¥	N≠ ¥
	FM-2	N≠ ¥	N≠ ¥	N≠ ¥	N≠ ¥	N≠ ¥	N≠ ¥	N≠ ¥	N≠ ¥	N≠ ¥
	FM-3	N≠ ¥	N≠ ¥	N≠ ¥	N≠ ¥	N≠ ¥	N≠ ¥	N≠ ¥	N≠ ¥	N≠ ¥
	FM-4	N≠ ¥	N≠ ¥	N≠ ¥	N≠ ¥	N≠ ¥	N≠ ¥	N≠ ¥	N≠ ¥	N≠ ¥

D/R & EXP (13)	FM POS		D/R		EXP		TYPE	Manual or FM
			L/D	R/U	L/D	R/D		
	0	AILE	%	%	%	%	Only EXTRA FM	
		ELEV	%	%	%	%		
		RUDD	%	%	%	%		
	1	AILE	%	%	%	%		
		ELEV	%	%	%	%		
		RUDD	%	%	%	%		
	2	AILE	%	%	%	%		
		ELEV	%	%	%	%		
		RUDD	%	%	%	%		
	3	AILE	%	%	%	%		
		ELEV	%	%	%	%		
RUDD		%	%	%	%			
4	AILE	%	%	%	%			
	ELEV	%	%	%	%			
	RUDD	%	%	%	%			

TYPE: NORMAL ¥ VTR 50% ¥ VTR 60% ¥ VTR 70% ¥ VTR 80% ¥ VTR 90% ¥ EXP/LIN ¥ LIN/EXP

Function Select (17)	Flight Mode	(D/R) SW	INH ¥ AILE	¥ ELEV	¥ RUDD	
		EXTRA	INH ¥ ACT			
			Channel	Trim		
	GEAR Switch		INH ¥ ACT	-----		
	FLAP Lever		INH ¥ ACT	Flap	INH ¥ ACT	
	AUX2 Switch		INH ¥ ACT	-----		
	AUX3 Lever		INH ¥ ACT	Elev. Roll	INH ¥ ACT	
	AUX4 Knob		INH ¥ ACT			

THRO CURVE (18)	POS	EXP	L	1	2	3	4	5	6	H
	1	OFF	IN	0						100
		¥ ON	OUT							
	2	OFF	IN	0						100
¥ ON		OUT								
SW	FMO/E-F ¥ FM1/MID ¥ FM2/LND ¥ FM3/MIX ¥ FM4/AUX ¥ GER ¥ SNP ¥ STK ( )									

Wing Type (22)	Wing	NORMAL ¥ FLAPRON ¥ ELEVON ¥ QUAD FLAP
	DIFF. SW	FMO/EF ¥ FM1/MID ¥ FM2/LND ¥ FM3/MIX ¥ FM4/AXU ¥ GR ¥ SNP ¥ STICK ( )
	Rate	pos0 % pos1 %
	Tail	Normal ¥ V-TAIL ¥ DUAL ELEV

Trace Rate (14)		L	%	D	%	L	%	
		% U			% R		%	
Trim Rate (83)			%		%		%	
Snap Roll (31)	INH ACT	DIR	RDU	%		%	%	
			SW	0	RBD	%	%	%
				LDU	%	%	%	
		LDD		%	%	%		
		1	RBD	%	%	%		
			LDU	%	%	%		
	LDD		%	%	%			
	FM	FM-0	RDU/0 ¥ RDU/1 ¥ RBD/0 ¥ RBD/1 ¥ LDU/0 ¥ LDU/1 ¥ LDD/1					
		FM-1	RDU/0 ¥ RDU/1 ¥ RBD/0 ¥ RBD/1 ¥ LDU/0 ¥ LDU/1 ¥ LDD/1					
		FM-2	RDU/0 ¥ RDU/1 ¥ RBD/0 ¥ RBD/1 ¥ LDU/0 ¥ LDU/1 ¥ LDD/1					
		FM-3	RDU/0 ¥ RDU/1 ¥ RBD/0 ¥ RBD/1 ¥ LDU/0 ¥ LDU/1 ¥ LDD/1					
		FM-4	RDU/0 ¥ RDU/1 ¥ RBD/0 ¥ RBD/1 ¥ LDU/0 ¥ LDU/1 ¥ LDD/1					

R

		FLAP		ELEV	
Flap System (66)	Pos	MID			
		LND			
	SW	FM-0	FLAP ¥ 0 ¥ MID ¥ LND		
		FM-1			
		FM-2			
		FM-3			
FM-4					

ELEV Ø> FLAP MIX (63)	DN	%	UP	%
-----------------------	----	---	----	---

		AUX2			AUX3			
		0	1	2	0	1	2	
GYRO SENS Adj. (44)	Center	%	%	%	%	%	%	
	Stick Priority	INH ¥ AIL ¥ ELE ¥ RUD			INH ¥ AIL ¥ ELE ¥ RUD			
	End	%	%	%	%	%	%	
	FM	FM-0	0 ¥ 1 ¥ 2			0 ¥ 1 ¥ 2		
		FM-1	0 ¥ 1 ¥ 2			0 ¥ 1 ¥ 2		
	AUX2	FM-2	0 ¥ 1 ¥ 2			0 ¥ 1 ¥ 2		
FM-3		0 ¥ 1 ¥ 2			0 ¥ 1 ¥ 2			
INH	FM-4	0 ¥ 1 ¥ 2			0 ¥ 1 ¥ 2			

AILE Ø> RUDD MIX (62)	SW	FMO/EDF ¥ FM1/MID ¥ FM2/LND ¥ FM3/MIX ¥ FM4/AXU ¥ AXD ¥ GR ¥ STK ( )						
	Gain	pos0	L	%	R	%	DIFF	INH ¥ ACT
		pos1	L	%	R	%		

RUDD Ø> AILE/ ELEV (64)	SW	FMO/EDF ¥ FM1/MID ¥ FM2/LND ¥ FM3/MIX ¥ FM4/AXU ¥ AXD ¥ GR ¥ STK ( )						
	AILE	pos0	L	%	R	%	DIFF	INH ¥ ACT
		pos1	L	%	R	%		
	ELEV	pos0	L	%	R	%		
pos1		L	%	R	%			

		CHANNEL MST SLV	TRIM	DIFF	OFF SET	POS	GAIN																				
							+					-															
Program MIX (51) ~ (58)	1	INH ACT	->	OFF ON	INH ACT		0					%					%										
							1					%					%										
							SW FM0/E-F • FM1/MID • FM2/LND • FM3/MIX • D FM4/AXU ¥ AXD ¥ GR ¥ STK (																				
	2	INH ACT	->	OFF ON	INH ACT		0					%					%										
							1					%					%										
							SW FM0/E-F • FM1/MID • FM2/LND • FM3/MIX • D FM4/AXU ¥ AXD ¥ GR ¥ STK (																				
	3	INH ACT	->	OFF ON	INH ACT		0					%					%										
							1					%					%										
							SW FM0/E-F • FM1/MID • FM2/LND • FM3/MIX • D FM4/AXU ¥ AXD ¥ GR ¥ STK (																				
	4	INH ACT	->	OFF ON	INH ACT		0					%					%										
							1					%					%										
							SW FM0/E-F • FM1/MID • FM2/LND • FM3/MIX • D FM4/AXU ¥ AXD ¥ GR ¥ STK (																				
	5	INH ACT	->	OFF ON	INH ACT		0					%					%										
							1					%					%										
							SW FM0/E-F • FM1/MID • FM2/LND • FM3/MIX • D FM4/AXU ¥ AXD ¥ GR ¥ STK (																				
	6	INH ACT	->	OFF ON	INH ACT		0					%					%										
							1					%					%										
							exp	POS	L	1	2	3	4	5	6	H											
																	0	In	0							100	
							OFF ACT	1	In	0								100									
											Out																
							SW FM0/E-F • FM1/MID • FM2/LND • FM3/MIX • D FM4/AXU ¥ AXD ¥ GR ¥ STK (																				
							7	INH ACT	->	OFF ON	INH ACT		0					%					%				
													1					%					%				
exp													POS	L	1	2	3	4	5	6	H						
	0	In	0																						100		
OFF ACT	1	In	0										100														
				Out																							
SW FM0/E-F • FM1/MID • FM2/LND • FM3/MIX • D FM4/AXU ¥ AXD ¥ GR ¥ STK (																											
8	INH ACT	->	OFF ON	INH ACT		0							%					%									
						1							%					%									
						exp							POS	L	1	2	3	4	5	6	H						
							0	In	0																100		
						OFF ACT	1	In	0								100										
										Out																	
						SW FM0/E-F • FM1/MID • FM2/LND • FM3/MIX • D FM4/AXU ¥ AXD ¥ GR ¥ STK (																					

Fail-Safe (77)	Z	HOLD • 1.0s • 0.5s • 0.25s							
	S	THRO	AILE	ELEV	RUDD	GEAR	FLAP	AUX2	AUX3
		HLD • FS	HLD • FS	HLD • FS	HLD • FS	HLD • FS	HLD • FS	HLD • FS	HLD • FS

Pilot Link (78)	INH • MST • SLV
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TRIM RATE (83)	THRO	AILE	ELEV	RUDD
	%			



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