JR DSM

12X

12-CHANNEL COMPUTER RADIO SYSTEM WITH SPEKTRUM 2.4GHz DSM TECHNOLOGY

INSTRUCTION AND PROGRAMMING MANUAL

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Using the Manual

The 12X offers sophisticated programming features for three model types: airplanes, helicopters and sailplanes. This manual is divided into four sections. The first section, pages I-14 through I-27, includes common transmitter features and specifications plus overall operational information (i.e. charging batteries, binding, range checking and Frequently Asked Questions) sections that are common to all model types. The remaining three sections, pages A-1 through S-41, include instructions for using model-specific programming for airplane, helicopter and sailplane functions. An explanation of each programming function is provided, followed by illustrations of its corresponding display and instructions on how to access and adjust the function.

Section 1: Transmitter and Receiver Features and Specifications

JR 12X Transmitter

JR's 12X offers airplane, helicopter and sailplane pilots the highest level of sophisticated programming features combined with the benefits of Spektrum's 2.4GHz DSM® radio link technology. DSM (Digital Spektrum Modulation) technology offers a far superior RF link over narrow band systems, providing a higher level of confidence and safety. Now with even the most sophisticated models you'll no longer have to wait for an open frequency, worry about someone unintentionally powering up on the same frequency or have to plan a frequency-based flight matrix for competition. And for response-critical aircraft like 3D helicopters and airplanes, latency (the time it takes for a stick input to translate to a servo output) is significantly reduced, providing a more responsive, precise connection to your model.

Features

- Backlit screen
- Ergonomic magnesium case
- Digital 3 + 1 trims
- Newly designed ball bearing gimbals
- The choice of a fully integrated 2.4GHz Spektrum™ system or Module-based system that allows the easy band switch from 2.4GHz Spektrum technology to 72MHz
- The highest level of sophisticated programming for three model types: Airplane, Helicopter, Sailplane
- Rolling Selector input
- Digital 3+1 trims
- 50-model memory
- Patented DuaLink® Technology (2.4GHz system only)
- ModelMatch™ (2.4GHz system only)
- ServoSync™

Specifications

- Model Number: (JRP1200 12X 2.4/JRP1210 12X MV)
- Number of Channels:12
- Modulation Type: Direct Sequence Spread Spectrum DSM2/ DSM1 protocol
- Band: 2.400–2.483GHz
- Spectral Capacity: 40 simultaneous systems
- Transmitter Current: 180mA/ DSM2; 280mA/ DSM1
- Resolution: 2048

Flash Memory

All preprogrammed data is protected by a flash memory that guards against main transmitter battery failure.

Battery Alarm and Display

When the transmitter voltage drops below 9.0 volts, the display flashes "BATT LOW" and an alarm sounds.

If you are flying when this occurs, land immediately.

JR R1221 Receiver

The R1221 receiver combines one internal with three remote receivers, offering superior path diversity. The radio system simultaneously transmits on two frequencies, creating up to four RF paths on two different 2.4GHz channels. This multi path redundancy, plus the fact that each of the 4 receivers are located in different locations throughout the aircraft, exposes each to a different RF environment creating a superior RF link in all conditions. The JR R1221 allows an optional Flight Log data recorder to be used. A flight log can be plugged into the data port of the receiver to provide an RF link data of the previous flight, allowing the confirmation of the operational performance of the systems.

Features

- 12 channels
- 1 internal receiver
- 3 remote receivers
- Patented MultiLink™ technology
- Two Types of Failsafe: SmartSafe™ and preprogrammed failsafe
- Instant QuickConnect™ should a power interruption occur
- Flight Log compatible

Specifications

- Number of Channels: 12
- Modulation: DSM2
- Band: 2.400–2.4835GHz
- Dimensions (WxLxH): 1.48 x 2.1 x .628 in
- Weight: Main .7 oz (20 g) Remote 3 g/.2 oz each
- Current: 70mA
- Voltage Range: 3.5 to 10V
- Resolution: 2048

Note: The 12X includes a JR1221 12-channel receiver. The 12X is also compatible will all current JR and Spektrum DSM aircraft receivers including:

- AR6000 6-channel Parkflyer receiver
- AR6100 6-channel 3.5-gram Parkflyer receiver
- AR6100e 6-channel 3.5-gram end pin Parkflyer receiver
- AR6200 6-channel full range receiver
- AR6300 6-channel 2-gram Nanolite slow and micro flyer receiver
- AR7000 7-channel full range receiver
- AR9000 9-channel full range receiver
- AR9100 9-channel PowerSafe™ full range receiver
- R921 9-channel full range receiver
- R922 9-channel PowerSafe full range receiver
- R1222 12-channel PowerSafe full range receiver

Important: When using the 12X with Parkflyer receivers (the AR6000, AR6100, AR6100e, and AR6300), it's imperative that these receivers only be flown in parkflyer-type aircraft (small electric airplanes or mini and micro helicopters). Flying receivers designed for parkflyers in larger aircraft could cause a loss of control.

Charging

Transmitter/Receiver

Note: It is imperative that you fully charge both the transmitter and the receiver battery packs prior to each flying session and that you check the condition of the receiver battery between each flight using a reliable battery tester with a built-in load. The included wall charger charges at a 250mA rate. In order to fully charge the included batteries, it's necessary to leave the charger and batteries hooked up to the included wall charger for 8–10 hours.

An optional fast charger can be used to charge both the transmitter and receiver batteries, however, it's imperative that the batteries are properly charged and the charge condition be checked prior to flight. False Peaking is a common occurrence with many fast chargers/ batteries, giving an indication that the battery is fully charged when in fact the battery is only partially charged. False Peaking can lead to disastrous results and it is the pilot's responsibility to verify the charge condition of the batteries before every flight. (Also see Receiver Power Requirements page I-26.)

JR Transmitter Charging

The center pin on all JR® transmitters is negative. Therefore, the center pin on all JR 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 may not apply in this instance. You must make sure that the center pin of your JR transmitter is always connected to the negative pole for correct polarity.

Note: When using a fast charger to charge the transmitter battery, do not exceed 1.5 amps (or 1500mAh) charge rate or damage to the transmitter or battery can occur.

Using the Included Charger

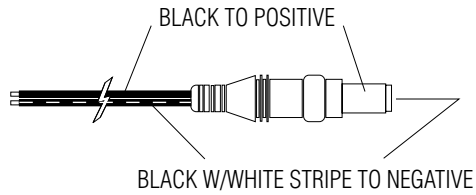
The pilot lamps should always be on during the charging operation. If not, check to make sure that both the transmitter and receiver are switched off.

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

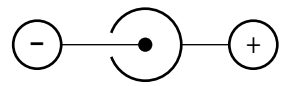
Do not use other manufacturers' after-market accessories that plug into the transmitter's charging jack if you are unsure of the polarity compatibility with your radio. Seek expert advice to avoid possible damage.

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

Charger Pigtail for Transmitter



Transmitter Charge Jack Polarity



Control Stick Tension Adjustment

Stick tension adjustments are accessible through covers that are located on the back of the transmitter (see photo). Carefully pull back the cover or remove the grip to access the gimbals' tension screws and then, using a small Phillips screwdriver, adjust each gimbal's tension screw for the desired tension (counterclockwise to loosen stick tension; clockwise to tighten stick tension).

Advanced Digital Trims

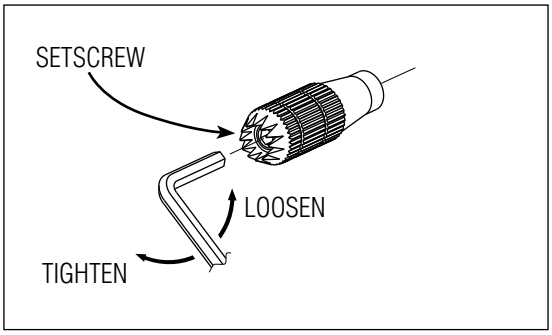
The 12X features Advanced digital trims. On the Normal display screen, if a trim lever is moved, the screen will automatically change to display the graphic position for the trim being adjusted. The 12X Aileron, Elevator and Rudder trim levers and the right and left side levers feature an audible center trim beep. This is helpful in determining the trim lever's center position during flight. In addition, the frequency of each trim step changes from full right/up to full left/down, allowing the pilot to be aware of the general trim position audibly without looking at the transmitter.

By using the Trim System Function Code 83 located in the System Mode, the amount of travel per each trim step can be adjusted as needed to match your specific application.

Please note that when the 12X transmitter is turned off, the trim values are stored in memory and are recalled when the system is turned back on.

Control Stick Length

Use a 2mm Allen wrench to unlock the setscrew to adjust the stick length. Turn the wrench counterclockwise to loosen the screw. Then, turn the stick clockwise to shorten or counterclockwise to lengthen the overall stick length. After the control stick length has been adjusted to suit your flying style, tighten the 2mm setscrew. If you desire longer sticks, JR offers a stick (JRPA047) that is approximately one inch longer than standard, and has various length anodized aluminum stick ends available (JRPA040-JRPA045). These stick ends are crafted from bar stock aluminum, and are available at your local JR dealer.

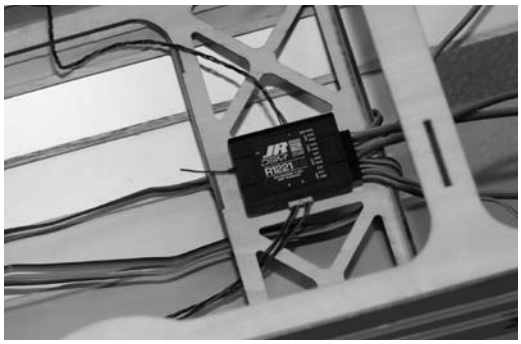


Neck Strap Attachment

An eyelet is provided on the face of the 12X transmitter that allows you to connect a Neck Strap.

Installing the JR R1221

The JR R1221 incorporates a single internal receiver and three remote receivers offering the security of four simultaneous RF links for the ultimate in multi-path RF security. One internal receiver is located on the main PC board, while 2 remote receivers must be plugged into one of the antenna ports in order for the system to operate. A third remote receiver (included) can be plugged into the remaining remote antenna port giving a total of four operational receivers. By locating these receivers in different locations throughout the aircraft, each receiver is exposed to its own RF environment, greatly improving path diversity (the ability of the receiver to see the signal in all conditions).



Note: The JR R1221 requires that at least two remote receivers be used.

Install the main receiver using the same method you would use to install a conventional receiver in your aircraft. Typically wrap the main receiver in protective foam and fasten it in place using rubber bands or Velcro straps. Alternately in electric models or in jets (low vibration), it's acceptable to use thick double-sided foam tape to fasten the main receiver in place.

Mounting the remote receiver(s) in a different location(s), from the primary receiver, gives tremendous improvements in path diversity. Essentially each receiver sees a different RF environment and this is the key to maintaining a solid RF link, even in aircraft that have substantial conductive materials (i.e. turbine engines with metal tail pipes, carbon fiber, tuned pipes, etc.) which can attenuate the signal.

Using double-sided foam tape (servo tape), mount the remote receiver(s) keeping the remote antenna(s) at least 2" away from the primary antenna. Ideally the antennas will be oriented perpendicular to each other; however, we've found this to not be critical. 6", 9", 12", 24", and 36" leads are available and in sophisticated aircraft, we've found it best to mount the remote receivers in different parts of the aircraft keeping the remote antennas as far away as practical from any conductive materials. A typical installation would include the main receiver mounted in the conventional location in the fuselage and the remote antennas in the nose (jets) in the top turtle deck and even in the tail. The optimum location is as far away from any conductive materials as practical.

In helicopters, there is generally enough room on the servo tray to achieve the necessary separation. If necessary a mount can be made using clear plastic to mount the external antenna.

Other important installation tips:

1. The servos should be mounted using rubber grommets and brass eyelets to isolate them from vibration. Do not over-tighten the mounting screws; this will negate the vibration absorption effect of the rubber grommets. The following diagram will assist you in properly mounting your servo.

The brass eyelets are pushed from the bottom up in the rubber grommets. When the servo screw is tightened securely, it provides the proper security as well as the proper vibration isolation for your servo.

2. The servo arms must be able to move freely over their entire range of travel. Make sure that the control linkages do not bind or impede the movement of any of the servos.
3. Mount all switches away from the engine exhaust and away from any high vibration areas. Make sure the switch operates freely and is able to operate over its full travel.

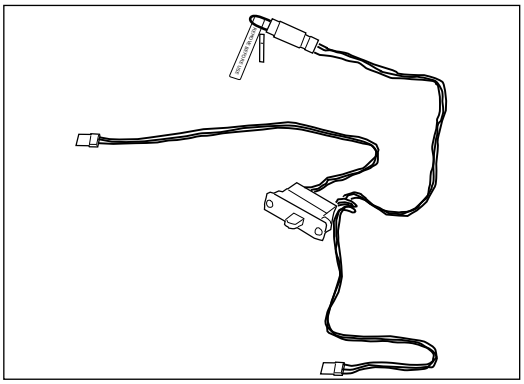
Binding

Binding is necessary to program the receiver to the transmitter so that the receiver will only recognize that specific transmitter, ignoring signals from any other sources. If the receiver is not bound to the transmitter, the system will not operate. During binding, the servo's failsafe positions are stored.

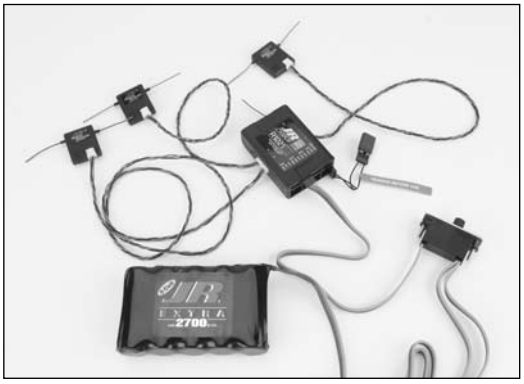
The following sequence describes the binding procedure for the JR1221, however, all JR and Spektrum DSM aircraft receivers are bound in the same way.

How to Bind

1. With the system hooked up as shown, insert the bind plug in the charge plug receptacle. The switch must be a 3-wire type switch (JRPA001 or JRPA004) to enter the bind mode through the switch. If a 3-wire switch is not available, install the male bind plug directly into the receiver bind/data receptacle and power the receiver through any other open port to enter the bind mode.



2. Turn on the receiver switch. Note that the LED's on all receivers should be flashing, indicating that the receiver is ready to bind.



3. Establish the desired failsafe stick positions: normally low throttle and flight controls neutral.

4. Press and hold the bind button on the back of the transmitter while turning on the power switch. The bind button should flash and within a few seconds the system should connect. The LED's on the receivers should go solid, indicating the system has connected.

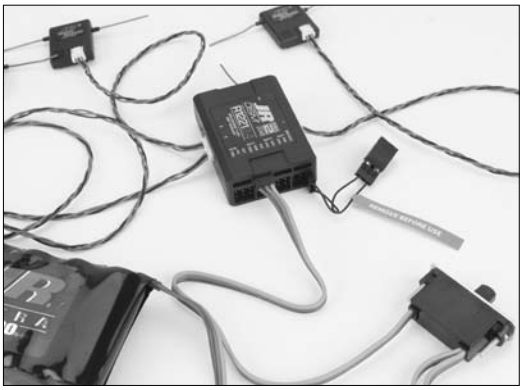
5. Remove the bind plug from the receiver or switch harness and store it in a convenient place.
6. After you've programmed your model, it's important to rebind the system so the true low throttle and neutral control surface positions are programmed.

   Note: To bind an aircraft with an electronic speed controller that powers the receiver through the throttle channel (BEC), insert the bind plug into the bind/data port and proceed to Step #2.

ModelMatch

The 12X features patented ModelMatch technology that prevents the operation of a model if the wrong model memory is selected. During binding the receiver actually learns and remembers the specific model memory (1 through 50) that the transmitter is currently programmed to. Later, if the incorrect model memory in the transmitter is selected and the receiver is turned on, the model simply won't operate, preventing a possible crash. Change programming to the correct model memory and you're set to fly.

Failsafe Functions



The JR R1221 receiver features two types of failsafe: SmartSafe and Preset failsafe.

SmartSafe

This type of fail-safe is especially ideal for most types of electric aircraft and is also recommended for most types of gas- and glow-powered airplanes and helicopters. Here's how SmartSafe works.

Receiver Power Only

When the JR R1221 receiver only is turned on (no transmitter signal is present) the throttle has no signal output. This prevents the arming of the electronic speed control. In glow-powered models, the throttle servo has no input so it remains in its current position. All other channels are driven to their stored fail-safe positions.

After Connection

When the transmitter is turned on and after the receiver connects to the transmitter, normal control of all channels occurs. After the system makes a connection, if loss of signal occurs, SmartSafe drives the throttle servo only to its preset fail-safe position (low throttle) that was set during binding. All other channels hold their last position. When the signal is regained, the system immediately (less than 4 ms) regains control.

Failsafe for JR/Spektrum

Preset fail-safe is ideal for sailplanes and is preferred by some modelers for their glow- and gas-powered aircraft.

Receiver Power Only

When the JR R1221 receiver only is turned on (no transmitter signal is present) all channels including the throttle have no signal output. This prevents the arming of the electronic speed control. In glow-powered models, the throttle servo has no input so it remains in its current position. All other channels are driven to their stored fail-safe positions.

After Connection

When the transmitter is turned on and after the receiver connects to the transmitter, normal control of all channels occurs. After the system makes a connection, if loss of signal occurs, preset fail-safe drives all servos to their preset fail-safe positions. For sailplanes it's recommended that the spoilers/flaps deploy to de-thermalize the aircraft, preventing a flyaway.

Some modelers using powered planes prefer to use this failsafe system to program a slight turn and low throttle to prevent their aircraft from flying away. When the signal is regained, the system immediately (less than 4 ms) regains control.

Programming SmartSafe

(All JR DSM and Spektrum Aircraft Receivers)

During the binding process, the bind plug is left in throughout the process and is removed only after the receiver connects to the transmitter. After the connection is made, confirmed by operating the servos, the bind plug can be removed. The receiver is now programmed for SmartSafe.

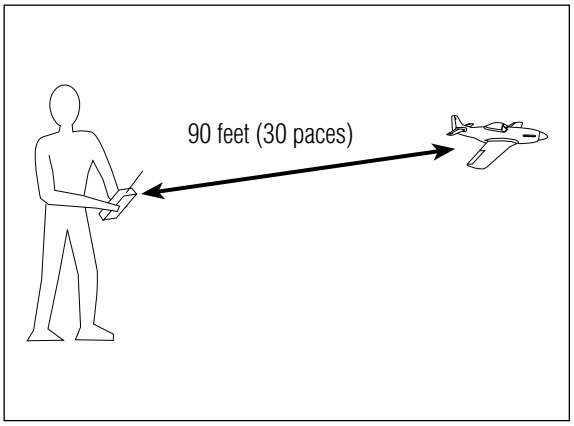
Programming Preset Failsafe for JR/Spektrum

(JR R1221, JR R1222, JR R921, JR R922, Spektrum AR9000, and Spektrum AR9100 Receivers Only)

During the binding process, the bind plug is inserted in the bind port or in the charge jack, and then the receiver is powered up. The LED's in each receiver should blink, indicating that the receiver is in bind mode. Now before binding the receiver to the transmitter and with the receiver in bind mode, remove the bind plug. The LED's will still be blinking. With the control sticks and switches in the desired fail-safe positions, bind the transmitter to the receiver by pressing and holding the bind buttons on the back of the transmitter/module and turning on the transmitter. The system should connect in less than 15 seconds. The receiver is now programmed for preset fail-safe.

> **Note**: Fail-safe positions are stored via the stick and switch positions on the transmitter during binding.

Range Testing



Before each flying session, and especially with a new model, it's important to perform a range check. The 12X incorporates a range testing system which, when the bind button on the transmitter is pressed and held, reduces the output power, allowing a range check.

Range Testing

1. With the model resting on the ground, stand 30 paces (approx. 90 feet) away from the model.
2. Face the model with the transmitter in your normal flying position and depress and hold the bind button on the back of the transmitter. This causes reduced power output from the transmitter.
3. You should have total control of the model with the button depressed at 30 paces (90 feet).
4. If control issues exist, call the Horizon Support Team at 1-877-504-0233 for further assistance.

Advanced Range Testing Using a Flight Log

While the above Standard Range Testing procedure is recommended for most sport aircraft, for sophisticated aircraft that contain significant amounts of conductive materials (i.e. turbine-powered jets, some types of scale aircraft, aircraft with carbon fuselages, etc.) the following advanced range check will confirm that all internal and remote receivers are operating optimally and that the installation (position of the receivers) is optimized for the specific aircraft. This Advanced Range Check allows the RF performance of each remote receiver to be evaluated and to optimize the locations of each individual remote receiver.

Plug a flight log (optional) into the data port in the receiver and turn on the system (Tx and Rx).

Advance the Flight Log until F- frame losses are displayed by pressing the button on the flight log.

Have a helper hold your aircraft while he observes the Flight Log data.

Standing 30 paces away from the model and helper, face the model with the transmitter in your normal flying position and depress and hold the bind button on the back of the transmitter. This causes reduced power output from the transmitter.

Have your helper position the model in various orientations (nose up, nose down, nose toward the Tx, nose away from the Tx, etc.) while your helper watches the Flight Log noting any correlation between the aircraft's orientation and Frame Losses. Do this for 1 minute. The timer on the transmitter can be used here. For giant-scale aircraft, it's recommended that the airplane be tipped up on its nose and rotated 360 degrees for one minute then record the data. Next place the airplane on its wheels and do a second test rotating the aircraft in all directions for one minute.

After one minute release the bind button. A successful range check will have less that ten recorded frame losses. Scrolling the Flight Log through the Antenna fades (A, B, L, R) allows you to evaluate the performance of each receiver. Antenna fades should be relatively uniform. If a specific antenna is experiencing a high degree of fades, then that antenna should be moved to a different location.

A successful Advanced test will yield the following:

- H- 0 holds
- F- Less than 10 frame losses

A, B, R, L- Frame losses will typically be less than 100. It's important to compare the relative frame losses and if a particular receiver has a significantly higher frame loss value (2X to 3X) then the test should be redone; if the same results occur, move the offending receiver to a different location.

Flight Log—Optional for JR R1221 Receiver

The Flight Log is compatible with JR R1221 receivers. The Flight Log displays overall RF link performance as well as the individual internal and external receiver link data. Additionally it displays receiver voltage.

After a flight and before turning off the receiver or transmitter, plug the Flight Log into the Data port on the JR R1221 receiver. The screen will automatically display voltage i.e. (6v2= 6.2 volts).

> **Note**: When the voltage reaches 4.8 volts or less, the screen will flash indicating low voltage.

Using the Flight Log

Press the button to display the following information:

- A - Antenna fades on internal antenna A
- B - Antenna fades on external antenna B
- L - Antenna fades on the left external antenna
- R - Antenna fades on the right external antenna
- F - Frame loss
- H - Holds

Antenna fades—represents the loss of a bit of information on that specific antenna.

Typically it's normal to have as many as 50 to 100 antenna fades during a flight.

If any single antenna experiences over 500 fades in a single flight, the antenna should be repositioned in the aircraft to optimize the RF link.

Frame loss—represents simultaneous antenna fades on all attached receivers. If the RF link is performing optimally, frame losses per flight should be less that 20.

A hold occurs when 45 continuous (one right after the other) frame losses occur.

This takes about one second. If a hold occurs during a flight, it's important to re-evaluate the system, moving the antennas to different locations and/or checking to be sure the transmitter and receivers are all working correctly.

> **Note**: A servo extension can be used to allow the Flight Log to more conveniently be plugged in without having to remove the aircraft's hatch or canopy. On some models, the Flight Log can be plugged in, attached and left on the model using double-sided tape. This is common with helicopters, mounting the Flight Log conveniently to the side frame.

Receiver Power System Requirements

With all radio installations it is vital that the onboard power system provides adequate power without interruption to the receiver even when the system is fully loaded (servos at maximum flight loads). This becomes especially critical with giant-scale models that utilize multiple high torque/ high current servos. Inadequate power systems that are unable to provide the necessary minimum voltage to the receiver during flight loads have become the number one cause of in-flight failures. Some of the power system components that affect the ability to properly deliver adequate power include: the selected receiver battery pack (number of cells, capacity, cell type, state of charge), switch harness, battery leads, regulator (if used) and power bus (if used).

While JR's receiver's minimum operational voltage is 3.5 volts, it is highly recommended the system be tested per the guidelines below to a minimum acceptable voltage of 4.8 volts during ground testing. This will provide head room to compensate for battery discharging or if the actual flight loads are greater than the ground test loads.

Recommended Power System Guidelines

1. When setting up large or complex aircraft with multiple high torque servos, it's highly recommended that a current and voltmeter (HAN172) be used. Plug the voltmeter in an open channel port in the receiver and with the system on, load the control surfaces (apply pressure with your hand) while monitoring the voltage at the receiver. The voltage should remain above 4.8 volts even when all servos are heavily loaded.

   Note: The optional Flight Log has a built-in voltmeter and it can be used to perform this test.

2. With the current meter inline with the receiver battery lead, load the control surfaces (apply pressure with your hand) while monitoring the current. The maximum continuous recommended current for a single heavy-duty servo/battery lead is three amps while short duration current spikes of up to five amps are acceptable. Consequently, if your system draws more than three amps continuous or five amps for short durations, a single battery pack with a single switch harness plugged into the receiver for power will be inadequate. It will be necessary to use multiple packs with multiple switches and multiple leads plugged into the receiver.

3. If using a regulator, it's important the above tests are done for an extended period of 5 minutes. When current passes through a regulator, heat is generated and this heat causes the regulator to increase resistance, which in turn causes even more heat to build up (thermal runaway). While a regulator may provide adequate power for a short duration, it's important to test its ability over time as the regulator may not be able to maintain voltage at significant power levels over time.

4. For really large aircraft or complex models (for example 35% and larger or jets), multiple battery packs with multiple switch harnesses are necessary or in many cases one of the commercially available power boxes/ busses is recommended. No matter what power systems you choose, always carry out test #1 above making sure that the receiver is constantly provided with 4.8 volts or more under all conditions.

5. The latest generation of Nickel-Metal Hydride batteries incorporates a new chemistry mandated to be more environmentally friendly. These batteries when charged with peak detection fast chargers have tendencies to false peak (not fully charge) repeatedly. These include all brands of NiMH batteries. If using NiMH packs, be especially cautious when charging making absolutely sure that the battery is fully charged. It is recommended to use a charger that can display total charge capacity. Note the number of mAh put into a discharged pack to verify it has been charged to full capacity.

Tips On Using 2.4GHz Systems

While your DSM equipped 2.4GHz system is intuitive to operate, functioning nearly identically to 72MHz systems, following are a few common questions from customers:

Q: Which do I turn on first, the transmitter or the receiver?

A: It doesn't matter. If the receiver is turned on first, the receiver starts scanning the band looking for a signal with its pre-bound GUID. At this time no servo output pulses are present and the throttle channel doesn't put out a pulse position, preventing the arming of electronic speed controllers, or in the case of an engine-powered aircraft, the throttle servo remains in its current position. When the transmitter is then turned on, the transmitter scans the 2.4GHz band and acquires two open channels. Then the receiver that was previously bound to the transmitter finds the GUID (Globally Unique Identifier code) stored during binding. The system then connects and operates normally.

If the transmitter is turned on first, the transmitter scans the 2.4 GHz band and acquires two open channels. When the receiver is then turned on, the receiver scans the 2.4GHz band looking for the previously stored GUID; when it locates the specific GUID code and confirms uncorrupted repeatable packet information, the system connects and normal operation takes place. Typically this takes 2 to 6 seconds.

Q: Sometimes the system takes longer to connect and sometimes it doesn't connect at all - why?

A: In order for the system to connect (after the receiver is bound), it must receive a large number of contiguous (one after the other) uninterrupted perfect packets from the transmitter. This process is purposely critical of the environment, ensuring that it's safe to fly when the system does connect. If the transmitter is too close to the receiver (less that 4 feet) or if the transmitter is located near metal objects (metal transmitter case, the bed of a truck, the top of a metal work bench, etc.), connection can take longer, and in some cases connection will not occur, as the system is receiving reflected 2.4GHz energy from itself and is interpreting this as unfriendly noise. Moving the system away from metal objects or moving the transmitter away from the receiver and powering the system up again will cause a connection to occur. This only happens during the initial connection. Once connected, the system is locked in; should a loss of signal occur (failsafe), the system connects immediately (4ms) when the signal is regained.

Q: I've heard that the DSM system is less tolerant of low voltage. Is that correct?

A: All DSM receivers have an operational voltage range of 3.5 to 10 volts. With most systems this is not a problem as, in fact, most servos cease to operate at around 3.8 volts. When using multiple high current draw servos with a single or inadequate battery/ power source, heavy momentary loads can cause the voltage to dip below this 3.5 volt threshold, thus causing the entire system (servos and receiver) to brown out. When the voltage drops below the low voltage threshold (3.5 volts), the DSM receiver must reboot (go through the start-up process of scanning the band and finding the transmitter) and this can take several seconds. Please read the receiver power requirement on page I-26 as this explains how to test for and prevent this occurrence. Note the JR R1221 and newly manufactured JR and Spektrum DSM receivers have a new QuickConnect feature that, if an impermanent power loss occurs, will reconnect the system in less than .25 seconds. If a power loss or brownout occurs, the receiver will indicate the power loss by flashing. If you land and the receiver is flashing, it's important that you investigate and correct the issue that caused the power loss.

Q: Sometimes my receiver loses its bind and won't connect, requiring rebinding. What happens if the bind is lost in flight?

A: The receiver will never lose its bind unless it's instructed to. It's important to understand that during the binding process the receiver not only learns the GUID (code) of the transmitter but the transmitter learns and stores the type of receiver that it's bound to. If the bind button on the transmitter is pressed at any time and the transmitter is turned on, the transmitter looks for the binding protocol signal from a receiver. If no signal is present, the transmitter no longer has the correct information to connect to a specific receiver and, in essence, the transmitter has been "unbound" from the receiver. We've had several customers that use transmitter stands or trays that unknowingly depress the bind button and the system is then turned on, losing the necessary information to allow the connection to take place. We've also had customers that didn't fully understand the range test process and pushed the bind button before turning on the transmitter, also causing the system to "lose its bind." If, when turning on, the system fails to connect, one of the following has occurred:

The wrong model has been selected in the model memory (Model Match).

The transmitter is near conductive material (Tx case, truck bed, etc.) and the reflected 2.4GHz energy is preventing the system from connecting (see #2 above).

The bind button was unknowingly (or knowingly) depressed and the transmitter was turned on previously, causing the transmitter to no longer recognize the receiver.

Q: Can I use a 3-cell LiPo pack in my transmitter?

A: No. All current JR and Spektrum transmitters are designed to operate using a 9.6-volt transmitter pack. A fully charged 3-cell LiPo pack puts out 12.6 volts. This higher voltage can overload the power-regulating transistor, causing damage and or failure, possibly in flight. Many of our customers have experienced failures using 3-cell LiPo packs and their use in JR and Spektrum transmitters is highly advised against. The 12X system will operate for over 8 hours using the included 2000mAh NiMH battery.

6. Q: How important is it that I test my system using a flight log?

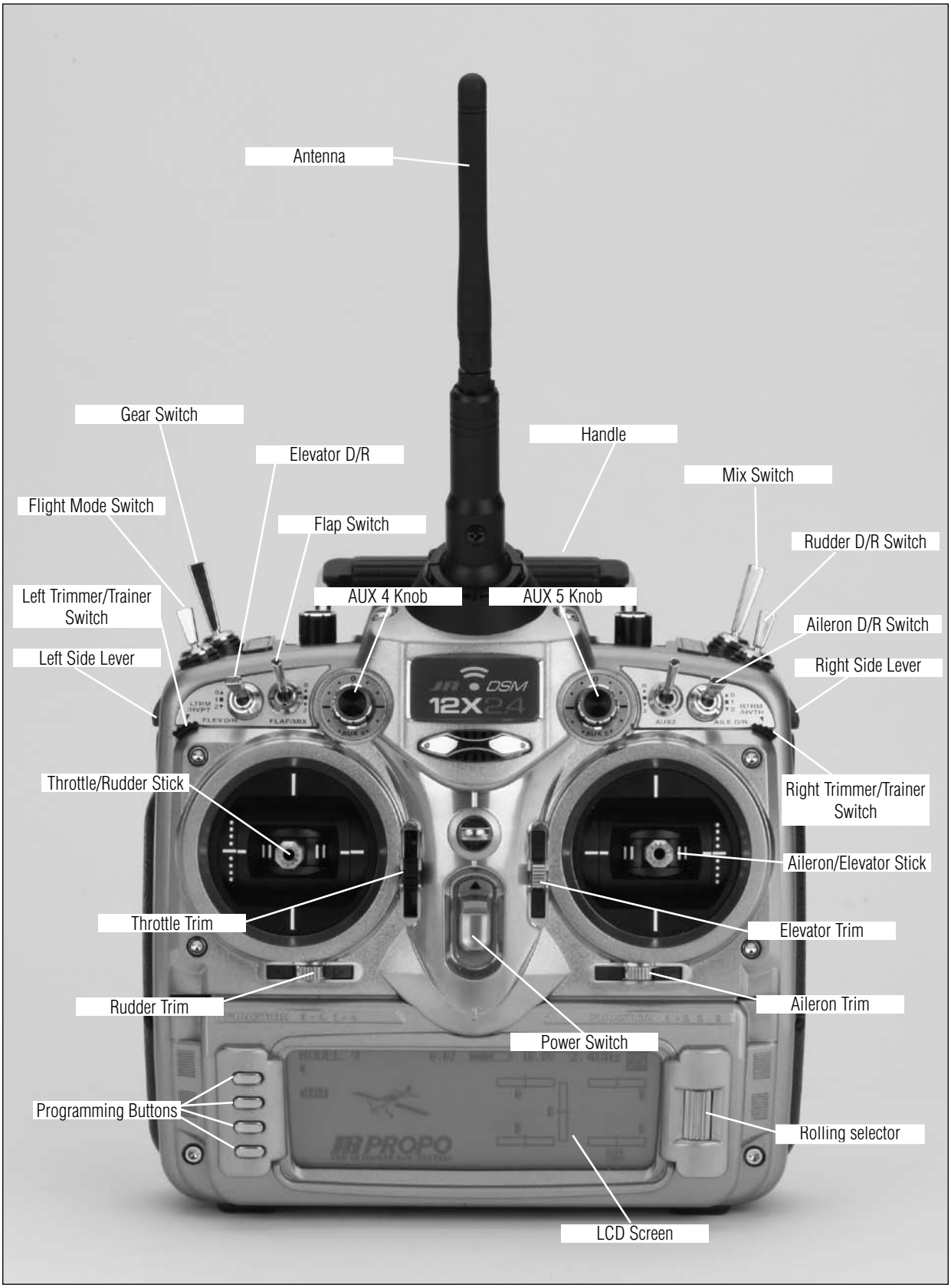
A: For most sport airplanes and helicopters the use of the flight log is unnecessary. For sophisticated aircraft, especially those that have significant conductive materials within the airframe (i.e. jets, scale airplanes, etc.), the Flight Log offers an extra measure of confidence that all radio components are working optimally. The Flight Log is an important tool that allows the confirmation that the installation (position of the internal and remote receivers relative to the conductive materials in the aircraft) is optimized and that the RF (radio) link is operating at the highest levels of performance.

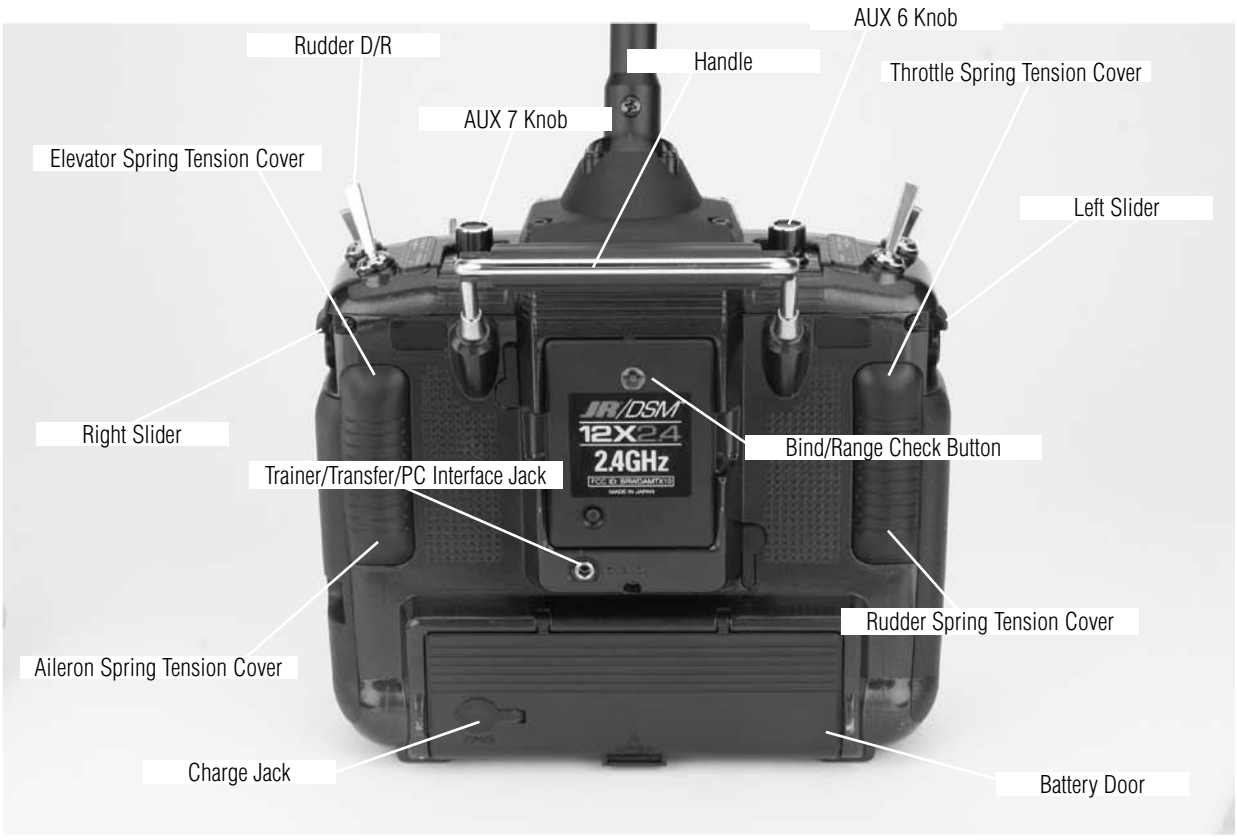
Airplane – Acro Mode

The ACRO mode is intended for powered fixed-wing aircraft. It contains a host of advanced features that are designed to assist the pilot in realizing the full potential of the aircraft. These features include:

- Up to 5 flight modes
- Switch and lever assignability
- Triple Rates and Exponentials for Aileron, Elevator and Rudder that can be combined or assigned to flight modes
- 4 programmable Wing Types (Normal, Flaperon, Delta, 4-aileron)
- Aileron Differential with two values
- V-Tail mixing
- Dual Channels for All Primary Flight Controls and Flaps
- Dual Throttles (With Independent Trims and Throttle Curves)
- Adjustable Trim Rates (10–100 Trim Steps)
- LST trim—trim can be programmed to affect end points or center point only
- Elevator-To-Flap mixing
- Aileron-To-Flap mixing
- Governor mixing
- Balance mixing allows precise mixing of slave channel to master at multiple points
- Throttle hold—can be assigned as a kill switch
- Aileron-To-Rudder mixing
- Throttle Curves (2)
- Flap System (With Elevator Trim, Auto Land, Elevator/Flap Delay)
- Gyro System (In-Flight Gain Selection of 3 Gains for up to 2 Gyros)
- Servo Speed (Independent in Both Directions – Eliminates Door Sequencers)
- 8 Programmable Mixers (Includes 5 Multi-Point Mixers)
- Programmable Trainer System (Selectable Channels for Student Control)
- Timers- up to three (Stopwatch, Countdown, Integrated)
- Servo Monitor (Automatically Renames Channels According to Assignments)
- Pitch Curve Mixing for variable pitch props

Transmitter Identification ACRO




AUX 6 Knob
Rudder D/R
Handle
Throttle Spring Tension Cover
AUX 7 Knob
Elevator Spring Tension Cover
Left Slider
Right Slider
Bind/Range Check Button
Trainer/Transfer/PC Interface Jack
Rudder Spring Tension Cover
Aileron Spring Tension Cover
Charge Jack
Battery Door

System Mode

System mode contains the foundational programming that is normally only used when first setting up a model. System mode functions include: model select, model name, model reset, wing type, etc.—functions that are typically set once during setup and then are seldom changed or adjusted. Below, and throughout this section, the functions are in the order that they appear in the System Mode List.

To Enter System Mode

Press ENT and hold while turning on the transmitter.

The screen should appear as shown above.

SYSTEM MODE LIST

System mode contains the follow screens:

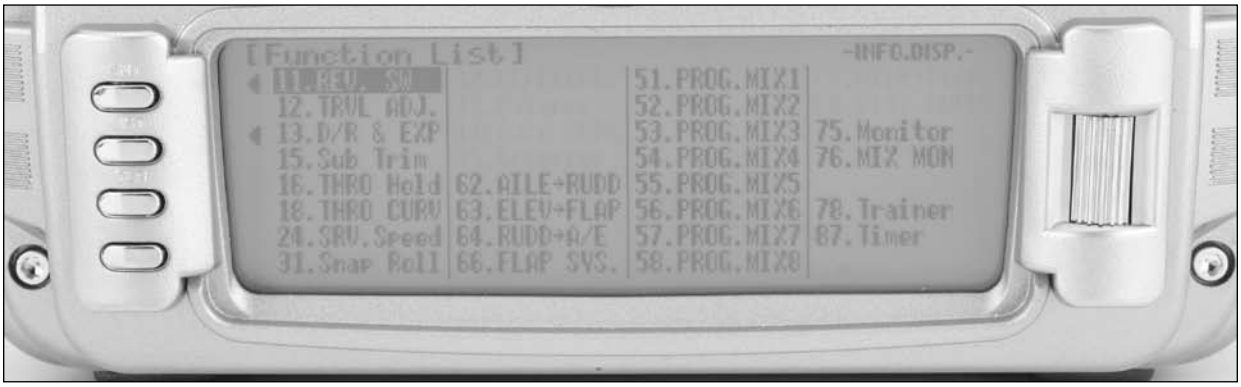
84: Model SEL	Model Select	Page A-6
81: MDL Name	Model Name	Page A-8
28: MDL Reset	Model Reset	Page A-9
89: Type SEL	Type Select	Page A-10
85: MODULAT	Modulation (12X MV system only)	Page A-11
93: Freq SEL	Frequency Select (12X MV system only)	Page A-11
83: Trim SYS	Trim System	Page A-13
91: STK Pos SW	Stick Position Switch	Page A-15
92: FM Name	Flight Mode Name	Page A-16
86: Transfer	Model Transfer	Page A-17
97: Warning	Warning	Page A-19
98: Settings	Settings	Page A-20
17: Device SEL	Device Select	Page A-21
22: Wing Type	Wing Type	Page A-27

Function Mode

FUNCTION MODE contains programming functions that are used to complete the setup and then used to adjust and fine-tune how the model flies. Below, and throughout this section, the functions are in the order that they appear in the Function List.

To Enter Function Mode

Press the LIST button after the transmitter is powered-up to obtain the FUNCTION LIST.



Function Mode List

Function mode contains the follow screens:

11: REV. SW	Reverse Switch	Page A-31
12: TRVL ADJ.	Travel Adjust	Page A-31
13: D/R & EXP	Dual Rate and Exponential	Page A-32
15: Sub Trim	Sub Trim	Page A-33
16: THRO Hold	Throttle Hold	Page A-33
18: THRO CURV.	Throttle Curve	Page A-34
24: SRV. Speed	Servo Speed	Page A-35
31: Snap Roll	Snap Roll	Page A-36
32: DIFFEREN.	Differential	Page A-37
33: Balance	Balance	Page A-38
44: Gyro SENS	Gyro Sensor	Page A-39
45: Governor	Governor	Page A-40
62: AILE- RUDD	Aileron to Rudder Mix	Page A-41
63: ELEV- FLAP	Elevator to Flap Mix	Page A-42
64: RUDD- A/E	Rudder to Aileron/Elevator Mix	Page A-43
66: FLAP SYS.	Flap system	Page A-44
51: PROG. MIX1	Program mix 1	Page A-46
52: PROG. MIX2	Program mix 2	Page A-46
53: PROG. MIX3	Program mix 3	Page A-46
54: PROG. MIX4	Program mix 4	Page A-46
55: PROG. MIX5	Program mix 5	Page A-46
56: PROG. MIX6	Program mix 6	Page A-46
57: PROG. MIX7	Program mix 7	Page A-46
58: PROG. MIX8	Program mix 8	Page A-46
67: AILE-FLAP	Aileron-To-Flap mix	Page A-54
68: PIT. CURV	Pitch Curve	Page A-55
75: Monitor	Monitor	Page A-58
76: MIX MON	Mix Monitor	Page A-58
77: Fail Safe	Fail Safe (12X MV system only)	Page A-58.5
78: Trainer	Trainer	Page A-59
87: Timer	Timer	Page A-60

System Mode

Programming a new model generally begins by accessing the SYSTEM Mode List. System Mode is where models are selected, the model type is chosen (airplane, helicopter or sailplane) and other high-level information is programmed for the model. It is also used to activate some of the more advanced programming features such as Flight Modes, Switch Assignments, Wing Types and Dual Control functions.

Accessing the System Mode

1. The System menu [System Mode List] is obtained by holding down the ENT button while turning the transmitter on.

84: MODEL SELECT- (Copy Function)

Model select allows the programming parameters for up to 50 different models to be stored and selected in up to 50 individual model memories. This screen also allows a model to be copied from the current selected model to any of the other 49 available internal model memories (model copy).

Note: When setting up a new model, it is recommended that an unused model memory is selected. If a current model memory is selected, it's recommended that the model be reset to the factory default setting before programming the new model. See model reset page A-9.

To Select a Model Memory

1. In the SYSTEM MODE, highlight and select Model SEL using the rolling Selector.
2. Use the rolling Selector to highlight MODEL then press the roller and select the desired model number to be used.
3. Return to the SYSTEM Menu by pressing the LIST button.

Model Copy

Making a backup copy of the model memory protects against losing the original program and also allows one to experiment with the original program, knowing that the original settings can be restored by copying the backup copy back to the original model memory.

To Copy a Model to Another Internal Memory

1. In the SYSTEM MODE, highlight and select Model SEL using the rolling Selector.
2. Use the rolling Selector to highlight Select then press the roller to access Model Copy.
3. Rotate the roller to select the desired model memory that you wish to copy the current program to (1-50).
4. Press the roller to select the highlighted model that you wish to copy to.
5. Press the COPY button to copy the current model list above to the selected model listed below.
6. Return to the SYSTEM Menu by pressing the LIST button.

Note: The model memory that is copied to will be replaced with the current model memory programming. It is recommended that a model memory that is not being used be selected to “copy to,” as the information in that memory will be erased and replaced with the current model memory during copying.

81: Model Name

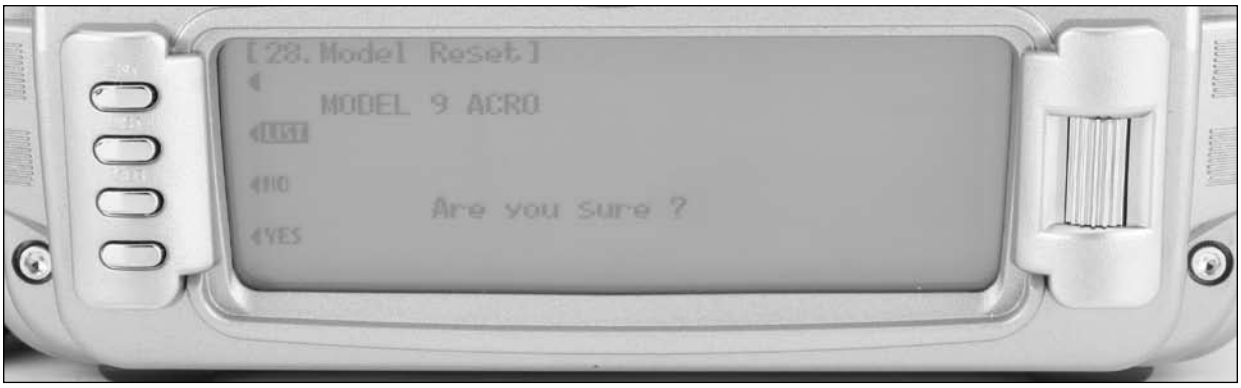
The model name screen allows each model to be given up to a sixteen-digit name or number. This is convenient for identifying a model. The model's name will appear on the main info screen.

To Name a Model

1. In the SYSTEM MODE, highlight and select MDL Name using the Selector.
2. Position the cursor using the roller (indicates where the next character will be placed) at the beginning of the model name. Press the Selector to obtain a list of available characters.
3. Highlight and select the desired character to form the model name. After the character is selected, rotate the Selector to position the cursor where the next character is to be placed and press the Selector to obtain the character list again. Repeat until the model name is completed.
4. Return to the SYSTEM Menu by pressing the LIST button.

28: Model Reset

Model Reset is used to reset all programming to factory default settings. When setting up a new model it is important to reset all parameters to their default or factory settings before proceeding with any other programming. This is to ensure that there are no programming values or functions active from a previous model or programming session.



To Reset a Model Memory

1. In the SYSTEM MODE, highlight and select MDL Reset using the Selector.
2. Press the CLR button that is next to RESET on the display.
3. Press the lowermost button next to YES on the display to reset all data for this model.
4. Return to the SYSTEM Menu by pressing the LIST button.

89: Type Select

Type select allows the model type to be selected. Model types include HELI (helicopter), ACRO (airplane) and GLID (glider).

> **Note**: When changing model types, the programming information will be reset to the factory default setting, losing the previous settings.

To Select a Model Type

1. In the SYSTEM MODE, highlight and select Type SEL using the Selector.
2. Highlight and select ACRO using the Selector and press the selector to access the ACRO mode.
3. Return to the SYSTEM Menu by pressing the LIST button.

85: Modulation - (12X MV System only)

Note: This function is only available on the 12X MV version and only when the TSM-72A 72MHz module is plugged in.

Important: When the 72MHz module is plugged in and the system is turned on, the antenna must be attached. Operating the 72MHz module without the antenna attached could overload the internal transistor causing a failure.

Warning: Only the JR TSM-72A and JRM2.4 modules are compatible with the 12X MV. Do not install a standard-type JR, Spektrum or other branded module in the 12X as damage will occur.

The 12X MV version radio system allows the RF module to be replaced allowing the system to operate on 72MHz or 2.4GHz. Note that the transmitter automatically detects which module is installed and modifies the accessible programming appropriate to the module selected.

The Modulation screen (code 85) allows the selection of modulation for 72MHz receiver types. Modulation types available are:

- APCM - JR's newest version PCM (not available in the U.S.)
- SPCM - Most currently available JR PCM receivers use this type of modulation
- ZPCM - Compatible with older JR receivers
- PPM - FM modulation

Note: It's important to select the modulation to match the receiver type. JR receivers have the modulation type printed on the receiver.

To Program a Modulation Type

1. In the SYSTEM MODE, highlight and select Type MODULAT. using the Selector.
2. Highlight and select the currently selected modulation type (APCM) using the Selector and press the selector to access all available modulation types (APCM, SPCM, ZPCM, PPM).
3. Rotate the roller to highlight the desired modulation type then press the roller to select the modulation type.
4. Return to the SYSTEM Menu by pressing the LIST button.

93: Frequency Select- (12X MV system only)

Note: This function is only available on the 12X MV version and only when the TSM-72A 72MHz module is plugged in.

Important: When the 72MHz module is plugged in and the system is turned on, the antenna must be attached. Operating the 72MHz module without the antenna attached could overload the internal transistor causing a failure.

Warning: Only the JR TSM-72A and JRM2.4 modules are compatible with the 12X MV. Do not install a standard type JR, Spektrum or other branded module in the 12X as damage will occur.

The 12X MV version radio system allows the RF module to be replaced allowing the system to operate on 72MHz or 2.4GHz. Note that the transmitter automatically detects which module is installed and modifies the accessible programming appropriate to the module selected.

The Frequency Select function allows the selection of 72MHz channels 11 through 60 when the 72MHz module is installed. This screen displays the channel and corresponding frequency.

To Select a Frequency

1. In the SYSTEM Menu, highlight and select Type FREQ SEL. using the Selector.
2. Highlight and select the currently selected channel using the Selector and press the selector to access all available channels.
3. Rotate the roller to select the desired channel then press the roller to select that channel. The selected channel will be displayed on the main screen every time the transmitter is turned on and RF-ON or RF-OFF will be displayed on the left side of the screen. To transmit press RF-ON.

83: Trim System

The Trim System function adjusts the sensitivity of the 12X trim levers and the Flap and Aux trimmers (right and left trimmers). The standard digital trims are adjustable from 0–10 with 10 being the coarsest adjustment and 0 being trim off. Adjusting the digital trim values has no effect on the total trim travel, however, it affects the resolution of each trim input. When the value is set to 10, each click of trim adjusts the servo output by 10ms and there are only 10 trim increments from center to each end. When set to 5, the output is changed 5ms per trim step and there are 20 trim increments from center to each end. When set to 1, each click of trim changes the servo output by 1ms and there are 100 trim increments. When set to 0 the trim levers cease to function effectively, turning off the trim function. The right and left trim levers are adjustable from 0 to 200 and can be turned on/ off. When adjusted to above 100% the trimmer functions as a two- or three-position switch. Reducing the value increases the number of output positions.

When adjusting the digital trims (AILE, ELEV, RUDD), the total trim travel does not change – only the number of increments (beeps) changes, which makes for finer or coarser trim movements. When adjusting the analog throttle trim, however, the total trim travel is actually reduced when set to less than 100%.

Use a fairly coarse setting, such as the factory default 4, when test flying a model for the first flights in order to be able to trim it quickly; then use a finer setting, such as 3–1, for final precision trimming.

LST Trim

The LST trim feature has two options: LST and normal. In normal, when making trim changes using the aileron, elevator or rudder digital trims, the center as well as the end points is affected by the trim values. The right trim causes the center, the right end point and the left end point to all shift to the right. When LST is activated, only the center position is trimmed. The center is shifted to the right but the endpoints are not affected. This is useful for aircraft that have a hard stop endpoint to prevent over-travel caused by trim or if it's desired to have trim changes not affect the total roll pitch or yaw rate.

To Adjust the Trim Rates:

1. Highlight and select TRIM SYS. in the SYSTEM MODE to acquire the Trim System function.
2. Highlight and select the trim that is to be changed and use the Selector to set a value of 1–10 (1 = finest, 10 = coarsest).

   Note: The Flap and AUX trims are adjustable from 0 to 200 and can be turned off or on by selecting On or Off.
3. Repeat for other trims as desired.

To Select the LST Trim Function

1. Highlight and select the desired channel (AILE, ELEV or RUDD) next to (TYPE) LST and press the roller to select LST or NORM
2. Repeat for other channels as desired

91: Stick Position Switch

The Stick Position Switch function allows the throttle, aileron elevator or rudder stick positions to be preprogrammed to turn on/ off mixes, change throttle curves, change differential rates, start a timer and other functions. An example of this would be to have a smoke system that turns off below 25% throttle to prevent low throttle flameouts. Four stick position programs are available and one or more can be assigned to various mixes or functions. The stick position that turns the Stick Position switch off /on is selectable as well as the direction to turn on/ off. Also a symmetrical option is available that allows the function to be turned on with a preprogrammed equal right or left (up or down) stick position.

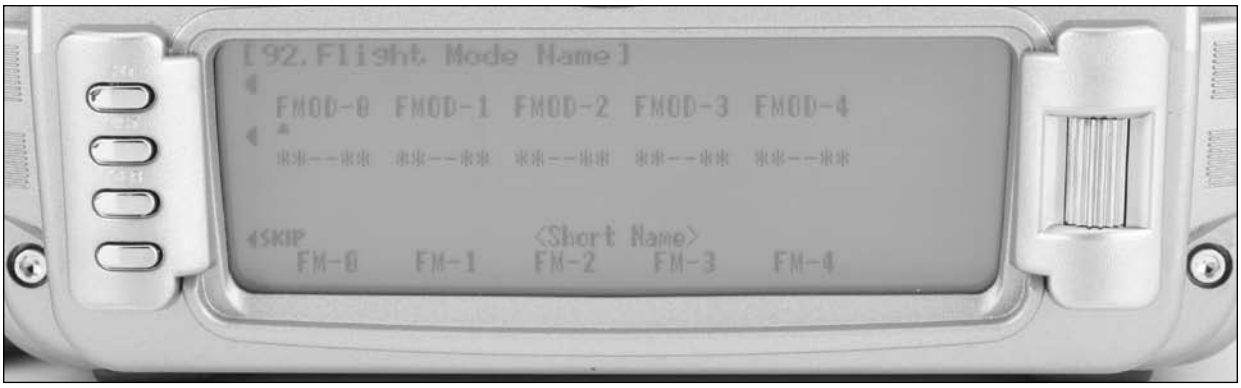
To Program a Stick Position Switch

1. In the SYSTEM MODE, highlight and select STK PosSW using the Selector.
2. Highlight the desired Stick position switch that you desire to use (SPS0, SPS1, SPS2, or SPS3) and press the roller. All four are the same.
3. Select the desired channel that will be used to trigger the Stick position (Throttle, Aileron, Elevator, and Rudder).
4. Rotate the roller to select POS and adjust to the desired value that you wish to have the mix function turn off/ on. 0 = center, L100= Left full stick travel, etc. Note ON/ OFF is displayed at the top of the screen and when moving the stick this will indicate that the function is working.
5. Use the roller to select ON and select Low/ High or Right / Left to access the desired direction that the function will turn on/ off.
6. A symmetrical function is available that allows the stick position to be turned on/ off as the stick is displaced symmetrically in either direction. It's necessary to first program a value in the POS, then highlight the SYM and activate it using the roller. The center can now be programmed to turn on or off by selecting the ON and highlighting Low/ High or Right /Left.

   Note: The above procedure establishes the base for turning on/ off mixes, change throttle curves, changes differential rates, etc. To program the stick position, it's necessary to go to the desired function in Function mode and select SPS0, SPS1, SPS2 or SPS3 under SW (switch) in that specific function.
7. Return to the SYSTEM Menu by pressing the LIST button.

92: Flight Mode Name

The Flight Mode Name program allows each flight mode to be custom named with up to six characters. On the main screen an abbreviated (short name of up to four characters) will be automatically displayed when that flight mode is selected. Examples for flight mode names may include 3DRATE, LAND, ROLLER, etc.



To Program a Flight Mode Name

1. In the SYSTEM MODE, highlight and select FM Name using the Selector.
2. Highlight the desired flight mode character position using the roller, then press the roller to access the list of the available characters.
3. Highlight and select the desired character to form the flight mode name. After the character is selected, rotate the Selector to position the cursor where the next character is to be placed and press the Selector to obtain the character list again. Repeat until the flight mode name is completed.
4. Use the roller to highlight the * below the flight mode name and press the roller to select up to four characters from the above flight mode to be automatically displayed on the main screen when that flight mode is selected.
5 Return to the SYSTEM Menu by pressing the LIST button.

86: Transfer

The TRANSFER function allows one 12X transmitter to transfer a model memory for a specific model to another 12X transmitter. This function is also used to transfer a model memory to the included PC date transfer allowing unlimited model memory storage and backup of your model's programming. The Transfer function is also used to receive data from another 12X or from the PC Data Transfer.

Note: The sending and receiving transmitters must both be 12X's or the PC Data Transfer device and a 12X. Transfer is not possible with any other system.

Preparing the 12X to Receive a Model Transfer

1. Hold the ENT button while plugging the DSC cord into the back of the transmitter to obtain the SYSTEM List. Plug the other end of the DSC cord into another 12X transmitter while holding the ENT button and after the following, prepare that transmitter for transfer send as described above.
2. Highlight and select TRANSFER in the SYSTEM Menu to obtain the Transfer display.
3. If RECEIVE is already displayed, continue with the next step. If TRANSMIT is displayed, highlight and select TRANSMIT, changing it to RECEIVE.
4. Select the model memory that is to receive the data by highlighting and selecting the model name/memory number and then scrolling to and selecting the model memory that is to receive the data. Select an unused model memory or a memory that contains data for a model that is no longer needed as the data in this model memory will be replaced by the model memory that is transferred and will be permanently lost.

   Note: The receiving model name/memory number can not be the currently selected model. If you wish to receive a model in the currently selected model name/memory number, go to the model select function and select a different model, then reenter the transfer function and follow the instructions above.
5. Press START on the left side of the display. Stand-by appears at the bottom of the display indicating that the system is ready to receive data. Follow the next steps to prepare the sending transmitter for memory transfer.

1. With the other end of the trainer cord plugged into the sending 12X transmitter in SYSTEM List as described in step 1 above, highlight and select TRANSFER (code 86) in the SYSTEM Menu to obtain the Transfer display.
2. The model to be transferred must be the currently selected model. If the model to be transferred is not currently selected, see Model SEL in the SYSTEM Menu to select the model to be transferred.
3. When the receiving 12X is ready, press START on the left side of the display. The data for the currently selected model is transferred to the receiving device.

97: Warning

The Warning function can be programmed to sound an alarm if a selected flight mode, switch positions or throttle stick position is in an inappropriate position when the transmitter is turned on. For example if the gear switch is in the retraced position and the transmitter is turned on, an alarm can sound warning that the switch will cause the gear to retract if the receiver is turned on. Or if the throttle is above a preprogrammed position when the transmitter is turned on an alarm will sound warning of an unsafe throttle position for startup. Stick positions can also be programmed to sound alarms. See page A-15 for programming stick position switches. Note that during the warning no signal is being transmitted. The Throttle stick is defaulted with a warning above 10% and an alarm will sound and no signal will be transmitted if the throttle is above 10% and when the transmitter is turned on. The warning function is available for the following:

- Flight Mode 0
- Flight Mode 1
- Flight Mode 2
- Flight Mode 3
- Flight Mode 4
- Flap Switch Normal
- Flap Switch Mid
- Flap Switch Land
- Gear Switch
- Mix Switch
- Stick Position Switch 0
- Stick Position Switch 1
- Stick Position Switch 2
- Stick Position Switch 3
- Throttle Stick Position
- Aileron 1
- Aileron 2
- AUX2 up
- AUX2 middle
- AUX2 down

To Program a Warning

1. In the SYSTEM MODE, highlight and select Warning using the Roller.
2. Highlight the desired flight mode, switch position or stick position switch (SPS) then press the roller to turn on off that function as a warning. Note that it is possible to activate multiple functions as a warning.

   Note: To select a Stick Position Switch as a warning it is first necessary to activate the stick switch. See Stick Switch Position Code 91 on page A-15 for more details.

3. If a throttle stick position is desired as a warning, highlight INH next to throttle and press the roller to activate the throttle stick position. Rotate the roller to select POS and adjust to the desired value that you wish to have the warning sound. Note that 0= low throttle, 50 = 50% throttle, etc. ON/ OFF is displayed at the top of the screen and when moving the stick this will indicate that the function is on/ off. The throttle stick position warning comes default set to active with a position of 10.
4. Use the roller to select ON and select Low or Hi to have the alarm sound above or below the POS position.
5. Return to the SYSTEM Menu by pressing the LIST button.

98: Settings

The Settings program allows the screen backlight to be turned on/ off/ or placed in auto (sleep) mode. This function also allows the audible beeper to be turned on or off. These functions are defaulted to Backlight Auto and Silent Mode off.

To Change Transmitter Settings

1. In the SYSTEM MODE, highlight and select Settings using the Selector.
2. Highlight the desired function. Display backlight or Silent Mode using the roller then press the roller to access and change the settings.
3. Return to the SYSTEM Menu by pressing the LIST button.

17: Device Select

Device Select is used to activate some of the more advanced features of the 12X. The Device SEL function is used to activate/inhibit the following:

- Flight Modes (5 in total)
- Throttle Hold
- Flap Trim
- Trim Common
- Switch, Lever and Knob Assignments
- Activate/Inhibit Switches/Channels
- Activate/Inhibit the Governor
- Activate/Inhibit the Gyro
- Activate/Inhibit the Pitch Curve Function
- Activate/Inhibit the Flap System
- Assign Functions and Channel to the Desired Switch Knob or Lever

Each of these options is described as follows.

Flight Modes

A Flight Mode represents an aircraft configuration (Dual Rate/Expo, program mixes, Aileron Differential, Flap System, Gyro System, etc.) that is programmed to optimize the control system to assist the pilot and the aircraft in performing a specific type of maneuver. Up to 5 flight modes are available in the 12X.

The objective of programming Flight Modes is to provide the ability to select a switch position to activate a collection of settings that are optimized to perform a maneuver. An aerobatic aircraft, for example, may be set up such that the Flight Mode switch in its 1st position (FM 0) configures the aircraft for precision flying; positioning the switch in its 2nd position (FM 1) sets the aircraft up for snap rolls; and positioning the switch in its 3rd position (FM 2) sets the aircraft up for aggressive 3D flight. Flight Modes could just as easily represent aircraft settings for Take Off, Flying, and Landing for a turbine-powered jet aircraft. Flight Modes can make the pilot's job easier by configuring and optimizing the aircraft to do different things by flipping a single switch.

Most of the functions found in the 12X that are switch selectable including programmable mixers, throttle curves, differential, gyro settings, servo speed, etc. can be assigned to one or more Flight Modes. This provides the ability to have up to 5 completely different aircraft configurations that are selectable in flight using switches.

Five Flight Modes are available in the 12X system. When 3 Flight Modes are activated, they are selected during flight by using one of six 3-position switches (Flight mode switch, Rudder D/R switch, Flap switch, Elevator D/R switch, Aux 2 switch, Aileron D/R switch, or Inhibit). To activate the 2 Extra flight modes (5 flight modes in total) the 4th and 5th flight modes are assigned to one of the following switches (Mix switch, Elevator D/R switch, Gear switch, Aileron D/R switch, one of the stick position settings (SPO0-SPO3), or Inhibit). Flight mode switches are selected and activated in the Device SEL function in the System menu. Once Flight Modes are activated, the pilot has a choice of using the Flight Mode switch to select up to 5 Dual Rates and Exponential settings for each of the primary controls (ELEV, AILE, RUDD), or Dual Rates and Exponential settings may continue to be controlled by the 3 individual Dual Rate switches. All other functions that can be activated by a switch can be assigned to 1 or more Flight Modes when Flight Modes have been activated.

To Activate Flight Modes

1. From SYSTEM Mode List, highlight and select DeviceSEL using the Selector.
2. Using the Selector, highlight and select INH next to FLIGHT MODE. When selected, 7 options appear: (Flight Mode SW, Rudder D/R SW, Flap SW, Elevator D/R SW, Aux 2 SW, Aileron D/R SW, or INH) Highlight and select the desired flight mode switch.

Once Flight Modes have been activated, FLAP TRIM and TRIM appears on the display.

3. To activate the two extra flight modes, using the Selector, highlight and select INH next to EXTRA. When selected, 8 options appear: MIX SW, Elevator D/R SW, GEAR SW, Aileron D/R SW, SPO0, SPO1, SPO2, SPO3, or INH) Highlight and select the desired EXTRA flight mode switch to activate the additional two flight modes.

Throttle Hold

The throttle hold function is normally used as a kill switch for glow-powered airplanes or as a safety/ arming switch for electric-powered aircraft. It can also be used to preset a programmed throttle position. For example with electric sailplanes it can be used to give full power when the switch is activated. The throttle hold function switch position and direction is assigned in Device Select. The actual programming of the throttle hold position is done in Code 16 Throttle Hold screen in the Function mode (see page A-33).

Note: Throttle hold is defaulted to the mix switch.

To Assign Throttle Hold to a Switch

1. In Device Select, highlight and select Throttle Hold using the Roller.
2. Using the Selector, highlight and select MIX SW next to THRO Hold. When selected, 12 switch options and directions appear: Highlight and select the desired throttle hold switch and direction.

Flap Trim

1. The digital FLAP TRIM lever is located on the front right face of the transmitter and is accessed with your right index finger. Flap Trim may be activated or deactivated in the Devic.SEL function by using the Selector to highlight either ON or OFF and pressing the Selector. The flap trim is defaulted to ON.

   Ordinarily this switch should be turned OFF, even if the aircraft has flaps or dual ailerons, The 12X provides other means of controlling flaps and disabling this switch will help prevent an out-of-trim condition if flaperons are used and the trim lever is accidentally moved.

Trim

The Trim function can be toggled between COM (common) and F.M. (Flight Mode) by pressing the Selector when COM or F.M. is highlighted. In the COM mode, the digital trims for Elevator, Ailerons, and Rudder are common or shared in all Flight Modes. If a trim change is made in any flight mode, the trim in all flight modes are also changed (common trims in all flight modes). If F.M. is selected in Stunt Trim, the 12X stores the digital trim positions independently for each Flight Mode. This allows the aircraft to be independently trimmed in each flight mode and when that flight mode is selected the previously set trim value for that flight mode is active. This is a very useful feature if switching between Flight Modes causes the aircraft's trim to change, such as when flaps are deployed by one of the Flight Modes causing the aircraft to have a pitch change. In this case, the pilot can simply use the Elevator digital trim to trim the Elevator to correct the pitch up tendencies when the flaps are deployed using a flight mode. Selecting each Flight Mode brings in a corresponding set of trims, allowing the aircraft to be independently trimmed for each flight mode during flight.

Note: When Trim is set to FMOD, be aware during the first flight and remember that the aircraft will need to be trimmed using the digital trims for Aileron, Elevator and Rudder for each Flight Mode selected during flight. If the aircraft is badly out of trim, remember that when switching from flight modes each flight mode will require trimming.

Switch Assignments

The 12X provides the ability to change the standard default switch assignments for the GEAR, FLAP, AUX2, AUX3, AUX4, AUX5, AUX6, and AUX7 channels. Changing the switch assignments is a matter of preference. The standard switch assignments may be changed in the Devic.SEL function contained in the SYSTEM MODE.

To Change One or More Switch Assignments:

1. In the Devic.SEL function, use the Selector to highlight and select the desired channel to the right of GEAR, FLAP, AUX2, AUX3, AUX4, AUX5, AUX6 or AUX7.
2. Once a switch is selected, a list of available switches is graphically displayed. Highlight and select the desired switch with the Selector.
3. Repeat for as many switches as desired.

Activate/Inhibit Channels

The 12X provides the ability to activate, inhibit or program channel 5 (Gear), channel 7 (Aux2) and channel 8 (AUX 3) to operate as a Governor, Gyro or Pitch function.

Note: Inhibiting a channel is necessary when auxiliary channels are used as dual primary flight controls, such as using 2 channels/servos for 2 Ailerons or 2 servos/ channels to operate the Elevator or Rudder. In this instance, the auxiliary channels are no longer to be operated by their auxiliary switches but rather by the Elevator and Rudder sticks and must be inhibited in the Device Select function.

Note: If any of the channels identified above are to be used as a 2nd channel for a primary flight control (AILE, ELEV, RUDD, FLAP), then be sure to Inhibit (INH) the switches for the channels in this function or they will not be available to use as a second control channel.

1. If GEAR, FLAP, AUX2, AUX3, AUX4, AUX5, AUX6 or AUX7 are to be used as a 2nd primary flight control, then inhibit the corresponding switch by highlighting ACT along the right side of the display; press the roller to select INH.

Note: When SYS appears next to FLAP, the FLAP SYSTEM function will appear in the FUNC.LIST (described later). If the aircraft is equipped with flaps, or equipped with Flaperons that are actually going to be used as flaps then SYS should be set next to FLAP.

Note: When GYR appears, the Gyro Function will appear in the FUNC.LIST (described later on page A-38). Two gyro programs are available.

Note: When GOV appears, the Governor Function will appear in the FUNC.LIST (described later on page A-38). Flight modes must be active for this function to be available.

Note: When PIT appears, the Pitch Function will appear in the FUNC.LIST (described later on page A-55).

22: Wing Type

Wing Types

The Wing Type function provides for 4 different wing types (NORMAL, FLAPERON, DELTA and 4- Aileron).

NORMAL wing type is used when only the Aileron channel is to be used to control ailerons, either with 1 servo, or multiple servos connected through a Y-harness to the aileron channel.

FLAPERON is typically used when each Aileron is controlled by a separate servo that is on separate channels and there are no other flaps on the aircraft. Setting the wing type to FLAPERON also makes available the Aileron Differential and Elevator-to-Flap mixing functions in the FUNC.LIST (described later).

DELTA is used with Delta wing aircraft (also referred to as Elevon). With Delta wing type the Ailerons and elevator are mixed giving roll and pitch control for Delta wing airplanes.

4-AILERON is used in aircraft where two servos are used to operate the right aileron and two servos are used to operate the left aileron. In this configuration each servo is independently adjustable for sub trim and travel adjust. A balance function is also available (page A--38) that allows the servo output to be matched throughout its travel preventing binding due to linkage geometry inaccuracies.

V-Tail Mix

V-Tail The Wing Type function provides programming for aircraft that have a V-Tail configuration where the 2 tail control surfaces are used for both Elevator and Rudder control.

Dual Flight Controls

Dual Control Functions

Wing Type allows Dual Aileron, Dual Elevator, Dual Rudder and Dual Flap functions to be activated. This function is used when two servos are used to drive the primary control surfaces allowing the independent adjustment of for sub trim and travel adjust of each channel. A balance function is also available (page A-38) that allows the servo output to be matched throughout its travel preventing binding due to linkage geometry inaccuracies.

> **Note**: To access Dual Flaps it is necessary to assign the Flap to SYS (system) in Device Select. When Dual Flaps are activated, Aileron-to-Flap mixing becomes available in the function list (page A-54).

> **Note**: Dual ailerons is a very important commonly used function because a large number of sport and aerobatic aircraft use 2 servos and 2 channels to operate the Ailerons, providing the ability to utilize Aileron Differential and to allow precise independent adjustment of sub trim and travel adjust for each aileron.

If the aircraft has flaps that are separate from the Ailerons, the Dual aileron wing type and (activating dual flaps) is recommended.

Twin Engine Control

The Wing Type function contains the Twin Engine (Twin E.) feature, which allows for setting up a 2nd throttle channel for a second engine, complete with its own independent sub trim, travel adjust and separate trims and throttle curves.

Wing Type

To Program a Wing Type

1. Highlight and select Wing Type in the System Mode List using the roller.
2. Use the roller to highlight Wing then select the wing type that is appropriate for your aircraft.

Normal- If the Aileron channel only is used to control both ailerons, either with a single servo or with 2 servos connected together via a "Y" harness, then the NORMAL wing type should be selected. Also use NORMAL if the aircraft has flaps that are separate from the ailerons; if two aileron channels are used, activate the Dual aileron channel listed below.

Flaperon- If 2 channels are to be used to control the Ailerons and the aircraft does not have separate flaps, select FLAPERON as the wing type. Plug the right Aileron into the Aileron channel (Ch2) and plug the left Aileron servo into the FLAP or AUX1 channel (Ch6) of the receiver

Note: If the ailerons are not going to actually be used as flaps, inhibit the FLAP Switch and FLAP TRIM in the Devic.SEL function in the SYSTEM Menu. This will eliminate having a severe out-of-trim condition if the FLAP Switch or FLAP TRIM is accidentally moved.

DELTA- If you have a Delta wing aircraft then select DELTA in wing type. This will mix the aileron and elevator functions to provide roll and pitch control for these types of aircraft. Plug the right control surface into the aileron channel (CH2) and plug the right surface into the elevator channel (CH3).

4-Aileron- If your airplane is equipped with two servos for the right aileron and two servos for the left aileron, then select the 4- Aileron option. Right aileron servos plug into channel 2 and channel 7. Left aileron servos plug into channel 5 and channel 8. Each servo is independently adjustable for sub trim and travel adjustment and the digital trim is active for all servos.

V-Tail

1. If the aircraft has a V-tail configuration, highlight INH next to V-tail in the Wing TYPE function and press the roller until ACT appears. Plug the right Elevator servo into the Elevator channel (Ch3) and plug the left Elevator servo into the Rudder channel (Ch4).

Dual Channels

1. To assign a 2nd channel to Ailerons, Elevator, Rudder or Flaps, highlight and select INH under the desired channel on the Mate line of the Wing TYPE display and a list of available channels is displayed.

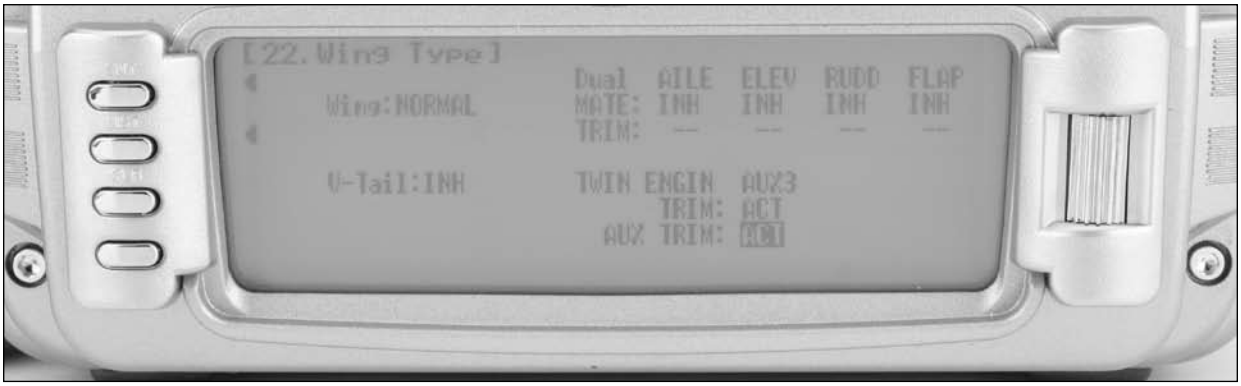
   Note: Channels/Switches must be inhibited (INH) in the Devic.SEL function before they will appear in the list as an option to be used as a Dual channel. The Flap SYS must be selected in the Deivc.SEL screen to access the Dual Flap function.

2. Highlight and select the channel that is to be the Mate (slave) to the control channel represented above it. Plug the 2nd control surface servo into the channel selected as the Mate.

3. INH will appear on the Trim Line of the display directly beneath the channel just selected. This means that the corresponding digital trim (FLAP TRIM or AUX TRIM) located next to the FLAP and AUX2 switches can be used as additional trims. However, the additional trims do not function in the same fashion as regular trims. Instead, they trim the controls such that both channels move in the same direction – like reflexing both Ailerons or in the case of Elevator halves, the Elevators would move in opposite directions. As a result, these additional trims should remain inhibited unless there is a special need for them. If changed to ACT, the corresponding trim switch (Right Trimmer or Left trimmer) will become active. If set to INH these additional trim switches are inactive. Normal trims continue to work regardless of the settings.

Twin Engine

If the aircraft is equipped with twin engines, the Twin Engine feature (Twin E.) may be used for a 2nd throttle channel with an optional separate digital trim.



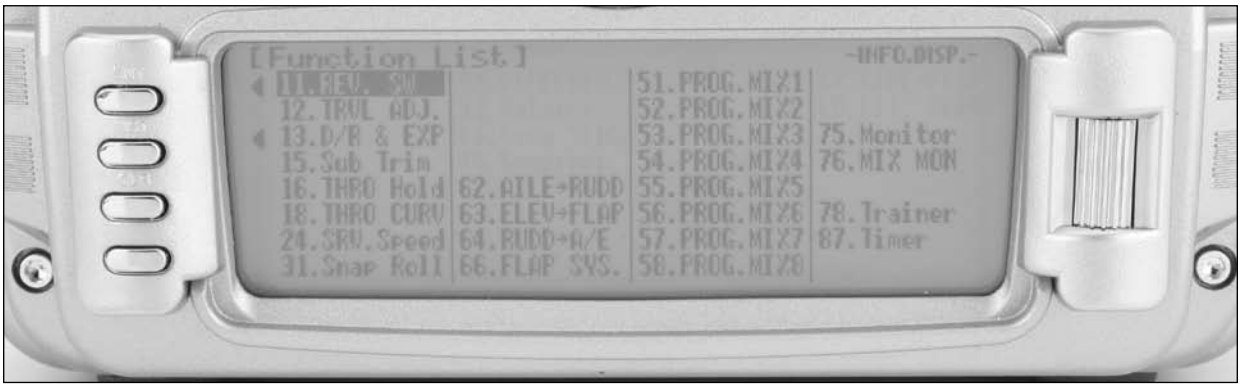
1. Highlight and select INH next to Mate under Twin ENGIN. A list of available channels will appear. Select the desired channel to be used as the second throttle channel. Plug the Left engine throttle servo into the channel selected as the Mate. Plug the Right engine throttle servo into the throttle channel (Ch 1).
2. If the second throttle channel is to be trimmed using either the normal throttle trim lever or a separate trim lever, highlight and select INH next to Trim under Twin E. causing the setting to change to ACT. When set to ACT, the 2nd throttle servo can be trimmed with the normal throttle trim.

Function Mode

The Function Mode contains programming that is used to complete the setup and then to adjust the aircraft's flight characteristics. Functions include Servo Reversing, Travel Adjust, Dual Rate and Expo, Sub Trim, Servo Speed, Programmable Mixes, Trainer and Timer functions, etc. Many of these functions are frequently used to adjust the flight characteristics during setup and at the field.

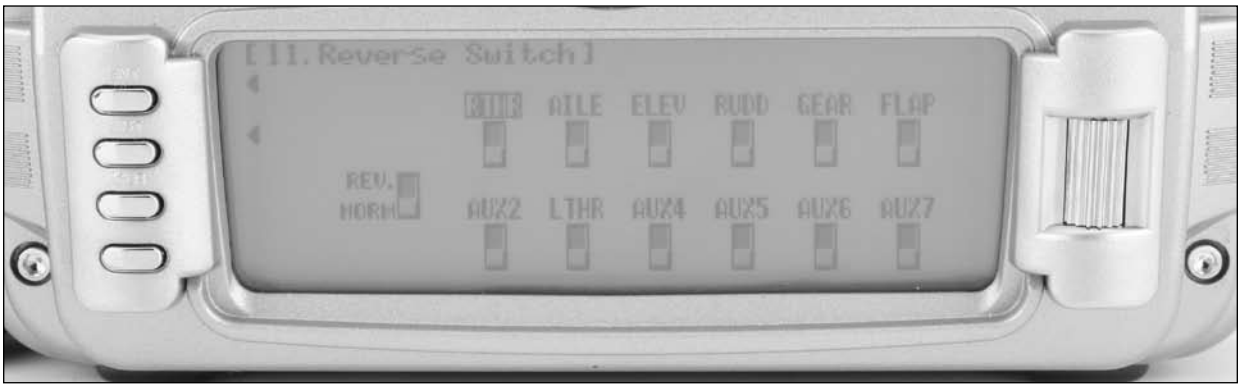
To Enter the Function Mode List

With the transmitter on Press LIST and the Function list will appear.



11: Servo Reversing

The servo reverse screen allows the direction of each servo to be selected.



To Program Servo Reverse

1. Highlight and select REV.SW in the FUNC.LIST to obtain the servo reversing display.
2. Use the Selector to highlight and select those channels that need to be reversed. Pressing the Selector toggles the channel between Normal and Reverse.

12: Travel Adjust

Travel Adjust allows the independent adjustment of servo travel for each direction of servo travel.

To Program Travel Adjust Values

1. Highlight and select TRVL ADJ. in the FUNC.LIST to obtain the Travel Adjust display.
2. Use the Selector to highlight and select each channel and adjust the travel in each direction by rotating the Selector. The direction of travel is changed by moving the stick/switch/lever in the desired direction to highlight L/R, U/D or +/-.

13: Dual Rate and Exponential

Three dual and exponential rates are available and are selectable via flight modes or selected switches.

Note: If extra flight modes are activated, up to 5 dual and exponential rates are available. Dual and Expo rates are independently adjustable in each direction by moving the appropriate stick in the desired direction.

To Program Dual Rate and Exponential Values

1. Highlight and select D/R & EXP in the FUNC.LIST to obtain the Dual Rate and Exponential display.
2. Highlight and select the desired channel (Aileron, Elevator or Rudder), noting that 3 sets of values will be displayed for each channel – Aileron, Elevator and Rudder.
3. Use the Roller to select and change the desired D/R and Expo values. Note that D/R and Expo values can be independently adjusted by holding the corresponding control stick in the desired direction while making adjustments.

Assigning Dual and Expo Rates to Flight Modes

Note: The Dual and Exponential rates can be combined and assigned to each of up to 5 flight modes. Flight modes must be activated in Device Select (see page A-21) to access the Auto D/R and Expo function allowing dual rates to be automatically selected in each flight mode.

To Assign D/R and Expo Values to Flight Modes

1. Highlight and select D/R & EXP in the FUNC.LIST to obtain the Dual Rate and Exponential display.
2. Flight Modes must be activated in Device. Use the roller to select AUTO and activate the auto function.
3. Highlight and select the desired channel (Aileron, Elevator or Rudder), noting that 3 sets of values will be displayed if three flight modes are active and 5 sets of values will be displayed if 5 flight modes are active for each channel.
4. Use the Roller to select and change the desired D/R and expo values. Note that D/R and Expo values can be independently adjusted by holding the corresponding control stick in the desired direction while making adjustments.

15: Sub Trim

Use Sub Trims to fine-tune the output alignment of the servo arms.

To Program Sub Trim Values

1. Highlight and select Sub Trim in the FUNC.LIST to obtain the Sub Trim Display.
2. Highlight and select the channels where the sub trims must be adjusted. Once a channel is selected, rotate the Selector until the servo arm is in the desired position.

16: Throttle Hold

The throttle hold function is normally used as a kill switch for glow-powered airplanes or as a safety/ arming switch for electric-powered aircraft. It can also be used to preset a programmed throttle position for electric sailplanes to give full power when the switch is activated. The throttle hold function switch position and direction is assigned in Device Select. The programming of the throttle hold switch position is done in Device Select screen in the System mode (see page A-21).

Note: Throttle hold is defaulted to the mix switch.

To Activate Throttle Hold:

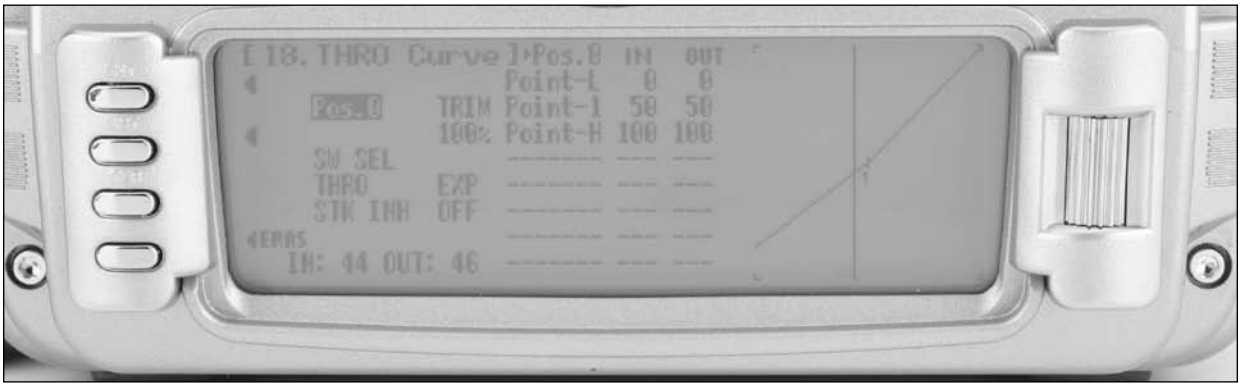
1. Highlight and select THRO Hold in the FUNC.LIST to obtain the Throttle Hold Display.
2. Highlight IHN and press the roller to activate the Throttle Hold function.
3. Highlight the HOLD Pos. and press the roller to allow throttle hold positions to be adjusted. 0% = low throttle low trim. 100% =full throttle.

   Note: The currently selected Throttle Hold switch is displayed under ACT. MIX SW is the default setting. To select another switch see Device Select Throttle Hold on page A-21.

18: Throttle Curves

Programmable throttle curves allow the throttle response (stick position vs. throttle output) to be manipulated. This is useful to optimize the throttle response for various maneuvers like torque rolls. Programmable throttle curves can be adjusted with the THRO CURV function. Two programmable throttle curves are available.

If the Twin E. function has been activated in Wing Type (page A-27 for twin-engine aircraft, independent throttle curves are available for each engine to help eliminate discrepancies in rpm between the two engines at all throttle positions.



To Program a Throttle Curve

1. Highlight and select THRO CURV in the FUNC.LIST. and press YES or NO to access the throttle curve function. Two different throttle curves can be programmed referenced to as Pos0 and Pos1.
2. If there is a need to have 2 throttle curves, use the Selector to highlight SW SELECT and a list of available Flight Modes and switches appears. Select the Flight Mode(s) (FM0, FM1, or FM2), switches and/or switch position (SPS) that is desired to be used to select between the 2 curves. The switch will be used to select between the Pos0 curve and the Pos1 curve. Highlight and select Pos0 to toggle between the Pos0 and Pos1, in order to display and adjust the 2 curves.

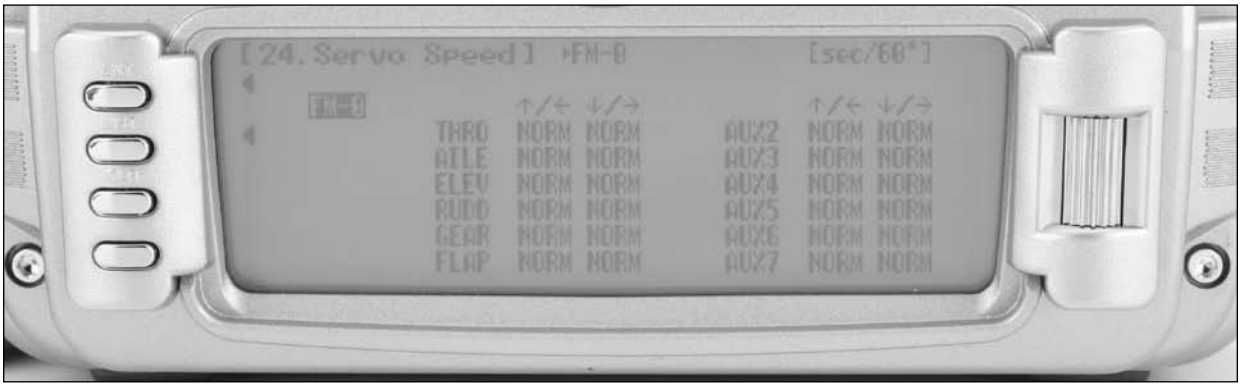
   Note: If Twin E. has been activated for a twin engine aircraft, there will be a Pos0 and Pos1 for both the right and left engines, providing a total of 4 possible throttle curves. However, instead of being named Pos0 & Pos1, they are named RTH.0, RTH.1, LTH.0, and LTH.1. They represent Right Throttle Pos0 & Pos1 and Left Throttle Pos0 & Pos1 respectively.
3. Highlight EXP and select it to turn exponential ON if desired. This will result in a smoothed throttle curve.
4. Using the roller, highlight the desired point (L, 1, or H) and press the roller to access the output value. Rotate the roller to change the output value. Repeat for all desired points. Note the graphic display will change to represent the new point position.
5. To adjust access Pos1 throttle curve (only available when SW is assigned to a switch) highlight Pos0 and rotate the roller to access Pos1 and repeat the step above to adjust Pos1 throttle curve.
6. To adjust the throttle trim authority, highlight the TRIM using the roller and rotate to select a trim authority value of 0 100%. Note the graphic display will change to represent the new trim authority.
7. To store a new point move the throttle stick until store appears on the lower left side of the screen. When the desired position is achieved press the store button and the point will be stored onscreen. Up to eight points can be stored.
9. THRO STK allows the throttle stick to be used to switch from Pos0 throttle curve to Pos1 throttle curve. To program a throttle curve Pos change with the throttle stick highlight the THRO STK and adjust the values using the roller to program the point at which the throttle curve is selected between Pos0 and Pos1.

24: Servo Speed

The 12X provides the ability to adjust the speed of servos on each channel in each direction. The speed may be reduced (servo slowed) from its normal speed but it cannot cause a servo to move faster than its rated specifications. Each servo can have 2 sets of speeds in each direction that are Flight Mode or switch selectable.

The servo speed function can be very useful for scale models with retractable landing gear and gear doors, since in many instances the need for gear door sequencers can be eliminated. If the gear door servos move at normal speed and the landing gear servos move at a slower speed when the gear is lowered, the gear doors will be open before the landing gear begins to come down. In the opposite direction, if the gear door servos move slowly and the landing gear servos move at normal speed, the gear can retract before the gear doors begin to close.

> **Note**: Many retract servos are non-proportional type servos that simply move from end point to end point. These types of servos are not adjustable in the servo speed function.



To Adjust Servo Speed

1. Highlight and select SRV. Speed. Speed FUNC.LIST.
2. Select SW SEL and press the roller to access Switch Select. If only one servo speed is desired, then all selectable switch positions in this screen should be P0. If two servo speeds are desired, then assign the desired switch that will change the servo speed to P1. Return to the main screen.
3. If a single set of servo speeds is desired, make sure the display is showing Pos0. If it is not, select Pos1 and change it to Pos0. Highlight and select the channel and direction for each servo that is to be adjusted. Once a direction for a servo is selected, the servo speed may be set so the servo travels from .193 seconds for 60 degrees of rotation to 16.4 seconds for 60 degrees of rotation. Adjust the speed of each servo until the desired speed is obtained.
4. If 2 sets of servo speeds are desired that are Flight Mode or switch selectable, one set of values is set to NORM for all channels, and the slowing of servos can be turned off by selecting the position (Pos0 or Pos1) that has the NORM values. Highlight and select Pos0 and change it to Pos1 and then highlight and select the channel and direction for each servo that is to be adjusted. Once a direction for a servo is selected, the servo speed may be set so the servo travels at the desired slower rate. Switch between Pos0 and Pos1 to view and adjust the 2 sets of values for each servo.

   > **Note**: Pos1 always has priority over Pos0. In other words, if multiple switches are selected and one of the switches is in its Pos1 position, then all other switches are ignored and the Pos1 values are in effect.

31: Snap Roll

The 12X has a Snap Roll system that can combine the Snap Roll switch with Flight Modes to select a direction (Right/ Up, Right/Down, Left/Up, and Left/Down) and the amount of deflection for Aileron, Elevator and Rudder. Up to four directions and corresponding rates can be programmed and a Direction/ Rate combination can be assigned to 1 or more of the 5 Flight Modes. Pressing the Snap Roll switch causes the aircraft to snap roll in the direction according to the rates assigned to the Flight Mode that is currently selected.

A Snap Roll stick switch position (Stick SW) can be programmed that will cause the respective control surface to skew to the programmed snap roll position when the stick is displaced beyond the programmed position.

Important: Use this function with extreme caution.

If Flight Modes have been activated, up to 5 Snap Roll directions/rates can be assigned —one per Flight Mode. If Flight Modes have not been activated then only one directions/ rate is available. The Snap Roll function is inhibited as a default and must be turned on in order to use it.

If the Snap Roll Function Is To Be Used

1. Highlight and select Snap Roll in the FUNC.LIST and then select INH to activate a single snap roll or select S.ROLLØ to activate up to 5 snap rolls assigned to Flight modes.
2. Scroll to the desired channel and set it to a desired value.
3. Repeat step 2 for the other channel's directions.
4. If more than one snap direction/ value is desired Highlight S.ROLLØ to access the snap roll 0 thru 4 and repeat the above steps for each snap roll.

32: Differential

The 12X Aileron Differential function reduces the travel of the Aileron that deflects downward without affecting the Aileron that travels upward and, therefore, can eliminate adverse yaw tendencies in rolling maneuvers.

Note: Differential is available in the FUNC.LIST only if the FLAPERON, Delta or 4-Aileron is selected in the Wing Type function in the SYSTEM Menu or a Dual channel has been assigned to ailerons in the Wing TYPE function.

The Aileron Differential function provides for 2 differential settings that are switch or Flight Mode selectable – Pos0 and Pos1.

To Use the Aileron Differential Function

1. Highlight and select AIL Diff. in the FUNC.LIST to obtain the Aileron Differential display.
2. If there is to be a single Aileron differential setting that is on all of the time, highlight and select Pos0 and adjust the desired percentage of differential. A positive value causes the downward Aileron to travel less while a negative value causes the upward Aileron to travel less (negative differential).
3. If two differential values are needed, highlight SW SEL and press the roller to select the desired switch(s) to select between Pos0 and Pos1 differential settings.
4. Return to the Differential screen and make adjustment to the POS 1 differential as desired.

   Note: Pos1 always has priority over Pos0. In other words, if multiple switches are selected and one of the switches is in its Pos1 position, then all other switches are ignored and the Pos1 values are in effect.

33: Balance

The 12X features a Balance function that allows the servo outputs of dual channels to be adjusted throughout the range. This is useful when two servos are used to drive a single surface (i.e. two aileron servos used to drive one aileron) and the linkage geometry of each servo is slightly different (typical with a tapered aileron). If both servos are mixed in a linear fashion, binding will occur throughout the control range due to linkage geometry inaccuracies. The Balance function allows the servo output of the master servo to be adjusted at 7 points throughout the range, compensating for any linkage geometry inaccuracies. Think of Balance as a curve mix that allows the master channels to be independently adjusted at seven different points, allowing a perfect bind-free setup throughout the control stroke.

Note: Balance is available in the FUNC.LIST only if the FLAPERON, Delta or 4-Aileron is selected in the Wing Type or if any of the dual functions (i.e. dual elevator, dual rudder etc.) is activated in Wing Type.

To Program the Balance Function

1. Highlight and select Balance in the FUNC.LIST to obtain the Balance display.
2. Note that the Balance screen will display the functions that a programmed in the Wing Type. If Flaperon only is programmed only one aileron column will appear in the balance screen. If 4- ailerons are selected then two columns will appear in the balance screen. This also applied to the dual elevator and rudder functions.
3. Using the roller highlight the desired position and press the roller to access the value. Rotate the roller to change the output position that is selected. The range is +100 to -100. Repeat this for all positions until no binding occurs throughout control travel.

44: Gyro Sensor

The 12X features a Gyro Gain system that allows in-flight selection of 3 gyro gain settings for up to two separate gyros or up to five gyro gain settings assigned to flight modes. The system provides for fixed gain values and has settings for normal or tail lock gyros. Gyro gains can be assigned and selected via a three-position switch or with Flight Modes.

Note: If one set of gains for a gyro is set to 0%, (in normal gain mode)then the gyro can be switched off during flight.

Note: In order for the GYRO System to appear in the FUNC.LIST, the AUX2 and/or the AUX3 channels must be set to GYRO in the Devic.SEL screen.

Note: This function is designed to be used only with gyros that have in-flight proportional gain adjustment capability. Single and dual rate gyros that use a potentiometer to adjust the gain will not work with this function.

Gyro Connections

Plug the gain connector of one gyro into the AUX2 port of the receiver. Plug the gain connector of another gyro (if used) into the AUX3 of the receiver. If only one gyro is to be used, connect its gain to either AUX2 or AUX3.

Note: The Devic.SEL function must be programmed to GYR, GEAR, AUX2 and/or AUX3.

Gyro Gain

To Access the Gyro Sensor

1. Highlight and select GYRO SENS. in the FUNC.LIST.
2. Highlight MANUAL then decide which switch to use to control gyro gain. Highlight and select AILE D/R, ELEV D/R, FLAP SW, AUX@ or AUTO (for flight mode).
3. Two types of gyro adjustments are provided, Normal and Tail Lock. Highlight and select the desired type of gyro that will be used. If heading lock is selected, note that a T or N is available for each gain setting. If T is selected, all values will result in the gyro being in tail lock mode. If N is selected, all values for that gain will be in normal mode.

   Note: For most airplane applications normal mode is recommended. Also note the Time Lag is available in Tail lock mode. Time lag is available when switching from tail lock to normal mode to prevent the servo attached to the gyro from jumping abruptly when switching from tail lock to normal mode.

4. Each gyro has 3 available gain settings (or up to five if extra flight modes are selected). They are labeled Pos0, Pos1, Pos2, Pos3 and Pos4 with a percentage next to each. They correspond to the positions of a 3-position switch where 0 represents the switch being in the upper position; 1 represents the middle position; and 2 represents the lower position.
5. Use the Selector to highlight and select the number 0 position for each gyro and set the percentage to the desired gain value.
6. Select the number 1 gain for each gyro and set it to the desired value.
7. Select the remaining gain values.

45: Governer

The 12X features a Governor program that can be activated in the Device Select screen. The Governor program is designed to be used with most currently available Governor systems, and allows for independent rpm settings for each of the active flight modes.

Note: Flight modes must be activated in Device Select to access the governor screen.

To Activate the Governor Screen

1. In the Devic.SEL function use the Selector to highlight under OUT the GEAR, Aux 2 or Aux 3 channel. GEAR, Aux 2 or Aux 3 must be programmed to GOV in order to access the governor function. The Governor program will now be visible in the Function Mode List.

To Access the Governor Screen

1. Highlight and select Governor in the FUNC.LIST.
2. Highlight the desired flight mode and adjust the value using the selector. Repeat this for all flight modes.

62: Aileron to Rudder

The 12X features a preprogrammed Aileron-to-Rudder mix. This mix causes the Rudder to deflect when the Ailerons are moved. This is useful for some types of aircraft that have adverse yaw, (right aileron results in a left yaw). By programming aileron to rudder mix in the same direction the airplane will make coordinated turns using ailerons only.

To Program Aileron-to-Rudder Mixing

1. Highlight and select AIL→RUD M in the FUNC.LIST to obtain the Aileron-to-Rudder mix display.
2. There are 2 sets of mixing values available – Pos0 and Pos1. If the Pos0 values are left at 0% then the mixer may be turned on and off – Pos0 would be off and Pos1 would be on (this can be reversed by leaving the Pos1 values at zero and putting values into Pos0). Highlight and select L next to Pos1 and set the value to give the desired amount of Left Rudder. A negative value will reverse the direction.
3. Highlight and select R next to Pos1 and set the value to give the desired amount of Right Rudder. A negative value will reverse the direction.
4. Scroll down to the bottom line of the display to select the Flight Mode and/or switch(s) that is to be used to turn the mixer on and off. The example below shows Flight Mode 2 set to Pos1, turning on the Aileron-to-Rudder mix. The throttle may also be used to turn the mixer on and off by highlighting and selecting THRO STK and setting the percentage of throttle to the point where the mixer is switched on/off.

   Note: The Pos0 values can also be set to something other than zero causing a different amount of Rudder deflection to occur when there is Aileron input. One or more switches can then be selected to switch between the two sets of values. With this setup there will always be some mixing, as indicated by either Pos0 or Pos1, and the mixing cannot be turned off.

63: Elevator to Flap

The 12X features a preprogrammed Elevator-to-Flap mix. The mixer causes the Flaps (or Flaperons) to move when the Elevator is moved, resulting in tighter looping maneuvers, or to provide some Aileron reflex for some 3D maneuvers such as Harriers. Typically, the flaps are set to travel downward with up Elevator and to travel upward with down Elevator. The direction that the flaps travel with Elevator input can be changed by using positive and negative values.

To Program Elevator-to-Flap Mixing

1. Highlight and select ELE→FLP M in the FUNC.LIST to obtain the Elevator-to-Flap mix display.
2. There are 2 sets of mixing values available – Pos0 or Pos1. If the Pos0 values are left at 0% then the mixer may be turned on and off – Pos0 will be OFF and Pos1 will be ON (this can be reversed by leaving the Pos1 values at zero and putting values in Pos0). Highlight and select DN next to Pos1 and set the value to give the desired amount of Flap travel in the Down direction when full Up Elevator is applied.
3. Highlight and select UP next to Pos1 and set the value to give the desired amount of Flap travel in the UP direction when full Down Elevator is applied.
4. Scroll down to the bottom line of the display to select the Flight Mode(s) and/or switch(s) that is to be used to turn the mixer on and off. The throttle may also be used to turn the mixer on and off by highlighting and selecting THRO STK and setting the percentage of throttle to the point where the mixer is to switch between On and Off.

64: Rudder to Aileron/Elevator Mix

The 12X features a Rudder to aileron/ elevator mix that is used to eliminate roll and pitch coupling when rudder is applied. Two mixes are available and independent mix values can be assigned for each direction. Various switches and flight modes as well the throttle stick and other stick positions (SPS) can be used to select either of the mixes. If one of the mixes has a 0% value then selecting that mix will turn off the mix.

To Program the Rudder-to-Aileron Mix

1. Highlight and select RUDD- A/E in the FUNC.LIST to obtain the Rudder to Aileron/ Elevator display.
2. Scroll to the desired value (aileron or elevator, right or left, position 0 or 1) and press the roller to select that value. Rotate the roller to program the desired mix value. Note that positive and negative values are available to reverse the direction of the mix.

   Note: If a mix value is desired to always be active (on), then program that mix value in Pos0 and leave all switches set to Pos0.

3. To select the desired switch, flight mode switch position or throttle position that will activate mix value Pos0 and Pos1, highlight the desired switch and choose 0 or 1. Note: Pos1 has priority over Pos0.

66: Flap System

The 12X features a three-position Flap System with Elevator compensation, programmable Delay, and an Auto Land feature. Its purpose is to allow the flaps to be programmed to three different positions, normally full flap, half flap and no flap or fully retracted position.

> **Note**: The Flap System is available in the FUNC.LIST only if SYS. is selected on the OUT line next to FLAP in the Device. Select function in the SYSTEM Menu.

Because flaps generally causes a change in pitch (Elevator trim), the Flap System provides for setting an Elevator deflection for each flap position. This is called Elevator Compensation. There is also a programmable Delay in .1-second increments up to a maximum of 2 seconds. The Delay determines how long it takes for the Flaps and Elevator to reach their positions. This delay function insures that the Flaps and Elevator reach their positions at the same time resulting in smooth Flap deployment and retraction with minimal pitch change.

The Auto Land feature, if implemented, automatically retracts the Flaps and Elevator compensation when the throttle is raised above a specified throttle position. This can be useful during a missed landing approach when a go-around is required. The Flap System allows the Flaps to be deployed using the Flap Switch, Flight Mode switch or a combination of both.

To Program the Flap System

1. Highlight and select FLAP SYS. in the FUNC.LIST to obtain the Flap System display.
1. If Auto Land is to be used, scroll to INH under AUTO LAND and select it with the Selector. INH will change to ACT when selected and toggles between ACT and INH each time the Selector is pressed.
2. Scroll down to THRO and press the Selector to show the throttle percentage. Rotate the selector until the throttle percentage (0–100%) is equal to where the Auto Land feature is to retract the Flaps and Elevator compensation.

It is recommended that the throttle position be set very high at first (between 90–99%) to give the aircraft a chance to regain some speed before the Flaps actually retract. As the Flaps retract, lift will decrease and the stall speed of the aircraft will increase and may cause a crash if the airspeed is too low. When there is a missed approach, advance the throttle slowly up to about 90% and wait until the aircraft picks up some speed before advancing the throttle to full, causing the Flaps to retract.

Flap

The FLAP values correspond with how far the flaps deflect when in the NORM, Mid, and Land positions. Generally the NORM position represents normal flying where the flaps are fully retracted. The Mid position is typically used for half flaps and the Land position is typically used for full flap for landing.

1. With the Flap switch in its uppermost (Normal) position (no flaps deployed), scroll to the NORM parameter under FLAP on the display. Select the value with the Selector and adjust its value to bring the flaps to their normal flying position (no flaps deployed).
2. With the Flap switch in the mid position, scroll to Mid under FLAP on the display and select it. Adjust the desired percentage to deflect the flaps the desired amount.
3. Put the Flap switch in the lowermost Land position. Scroll to Land under FLAP on the display and select it. Adjust the percentage to deflect the flaps to the desired position.

ELEV – Elevator Compensation

The ELEV values represent the Elevator deflection that will occur when the Flaps are deployed to their various positions. Some trial and error will be required to arrive at the exact values, but once properly adjusted, the aircraft will assume the proper pitch attitude for all flap positions.

1. Adjust the Elevator compensation values (ELEV) to the desired values for each switch position as per the flaps above.

Flight Modes

If Flight Modes have been activated in the Device SEL function, then FM0, FM1 and FM2 (and 3 and 4 if extra was activated) will appear along the right side of the Flap System display to represent the 3 Flight Modes. Each of the Flight Modes can be assigned one of the Flap values (NORM, Mid, or Land), so when that Flight Mode is selected during flight, the Flaps deploy to that position. SW is also an option. When SW is selected for a Flight Mode, flap operation is controlled by the Flap switch when in that Flight Mode.

If Flight Modes have not been activated, skip this portion of the Flap System.

1. For each Flight Mode, highlight and select FM0-FM2 and select either a flap position (NORM, Mid, Land) that the flaps are to assume when in that Flight Mode, or select SW if the Flap switch is to control the flaps when in that Flight Mode.

Delay

The Delay feature determines how long it takes for the flaps and Elevator to reach their positions. When the delay function is programmed, The 12X automatically times the Flaps and Elevator so that they reach their positions at the same time, resulting in smooth Flap deployment with minimal pitch change. The Delay is adjustable in .1-second increments up to a maximum of 2 seconds.

1. Highlight and select Delay in the Flap System display using the Selector. Then use the rotary to select a delay between .1- second and 2 seconds.

51 thru 58: Programmable Mixers

Programmable mixers are programmed to cause a second or slave channel to react as a result of providing input to the primary or master channel or to cause a channel to be controlled by moving a switch or lever. Programmable mixes are typically used to activate special aircraft functions like smoke systems, speed brakes, steer able nose gear, bomb drops, idle-up, etc. or to alter flight characteristics, for example down elevator at low throttle for aerobatic aircraft such that the aircraft tracks perfectly on the down lines at low throttle.

The 12X provides 3 Standard programmable mixes (PROG. MIX1 - PROG.MIX3) and 5 Multi-Point or Curve programmable mixes (PROG.MIX4 - PROG.MIX8). Multi-Point (or Curve) Mixing provides the ability to program a customized curve that the Slave channel will follow as it reacts to the Master channel's input. Multi Point mixes are different from Normal Mixes in that Normal Mixing results in a linear movement of the Slave channel in relation to the Master. With Multi-Point Mixing there are up to 8 points that can be adjusted to control the position of the Slave channel, providing the ability to custom tailor the output of the slave channel.

The primary channel is called the Master channel, while the channel that reacts to the Master is called the Slave channel.

Mixes are fully programmable, allowing any of the 12 channels to be Master, Slave or both (a channel can be mixed to itself). Trimmers and levers can also be used as a master and are extremely useful for programming proportional channel to be operated via a trimmer or lever. Additionally programmable mixes can always be on, or turned off and on via a programmed switch, Stick position or flight mode. The Snap Roll/ Trainer, switch (momentary switch SNPT) can also be programmed as the Master channel.

If dual functions have been activated in the Device Select screen, the following slave channels are available: AILV, FPRN, FROL, and RUDV, these functions allow the ailerons to be moved as flaps, flaps to be moved as ailerons, elevators to be moved as ailerons, rudders to be moved as speed brakes, both in or both out..

Additionally there are 2 options for Master channels:

"#" (pound sign), these Master channels are Origin type mixes. These include #THRO #AIL, #ELE, and #RUD. Origin mixing bypasses any other mixing that might affect that channel, such as throttle curves, exponential, travel adjust or other programming, and uses the stick position only to control the mix.

"+" sign, these Master channels are trim include type mixes. These include THR+, ELE+, AIL+, and RUD+. Trim Include mixes include the trim of the Master channel as well as any other mixing to the Master channel to control the Slave channel of the mix.

Standard Programmable Mixer - (Std. Prog Mixer)

The 12X has 3 standard programmable mixers that allow for linear mixing of a Master channel to a Slave channel. The standard mixers are PROG.Mix1, Mix 2 and Mix 3.

These mixes provide for 2 sets of mixing values named Pos0 and Pos1. If one set of values is set to 0% then the mixer can be turned On and Off with a stick, switch or lever. Each set of mixing values is comprised of 2 percentages to accommodate movement of the Master channel in both directions. This is shown in the illustration below where there is an upper and lower percentage for both Pos0 and Pos1.

A mix can be made to always be on by setting Pos0 values only and not selecting any switches to switch between the Pos0 and Pos1 values.

Master Channel - (Std. Prog Mixer)

The Master channel is the primary or controlling channel. The default for both the Master the Slave channel is THRO. The Master channel is selected by highlighting and selecting this parameter to obtain a list of channels and then selecting the Master channel from the list.

Note: There are 4 channels that appear more than once. They are Throttle, Aileron, Elevator and Rudder. Since these channels can be influenced by Dual Rate and Exponential settings, they are included in the list twice - once where the D/R and EXP settings are in effect and again where the D/R and EXP settings are ignored. The second time they are listed, there is a special designator to indicate that these channels can also be used as a Master while bypassing any Dual Rate and Exponential settings that may be associated with them. They are designated by "#" (pound sign) in front of the name - #THRO, #AILE, #ELE, and #RUD. When one of these channels is selected as the Master, all D/R, EXP and Curve settings associated with the Master are ignored during the mixing operation. Instead, the mixer reads only the physical position of the stick to perform mixing.

A (+) behind the channel indicates a trim include function. By selecting a channel with the (+) the trim lever affects both the master and slave channels.

Note: Some programmable mixes have + appearing after a specific channel and other mixes have # before that specific channel. Choose the programmable mix that offers the type of mix (origin of trim include) that you desire.

Slave Channel - (Std. Prog Mixer)

The Slave channel is the secondary receiving channel and will move according to the program mix in relation to the Master channel. The default for both the Master the Slave channel is THRO.

The Slave channel is selected by highlighting and selecting this parameter to obtain a list of channels and then selecting the Slave channel from the list. The list contains each of the 12 channels in the system and CANCEL.

Switch Position

The right side of the Programmable mix screen displays the available switch options. If you choose to have a switch control the mix, either on/off or have two mix values, highlight and select the desired switch(s) and select position 0 or 1. Each standard programmable mixer has two positions - Pos0 and Pos1 and each position has 2 percentages (upper and lower) to accommodate mixing when the Master is moved in both directions. Note that Pos1 has priority over Pos0.

Offset

Offset defines the position where the mixer changes directions. The Offset is defaulted to center position or 0 and this is most commonly used. With a 0 Offset, if the Rudder is the Master, moving the rudder stick to the left of center causes a mix in one direction while moving the rudder stick to the right of center causes a mix in the other direction. Directions correspond to the upper and lower percentages for Pos0 and the upper and lower percentages of Pos1. The amount of mix and actual direction that the slave moves is determined by the Pos0/Pos1 values. The Offset applies to both Pos0 and Pos1 settings.

The Offset may be changed by highlighting and selecting Offset and adjusting either a positive (+) or negative (-) value. A positive percentage moves the offset in one direction from center while a negative percentage moves the Offset in the other direction from center.

Mix Values

Each standard Programmable mixer can have two sets of mixing values - Pos0 and Pos1. Each set can have 2 percentages which control movement of the slave when the master is moved in each direction. A switch can be selected to switch between the Pos0 and Pos1 percentages.

The Pos0 settings determine how far, and in which direction, the slave channel moves when the master is moved above and below the Offset (the Master moving in both directions) when the switch is in a position to select the Pos0 values.

To enter Pos0 values, highlight and select Pos0, move the Master channel control (stick, lever or switch) in one direction and set the percentage and then move the Master channel control in the other direction and set its value

The Pos1 settings are identical to the Pos0 settings and determine how far, and in which direction, the slave channel moves when the master is moved above and below the offset (the Master moving in both directions) when the switch is in a position to select the Pos1 values.

To enter Pos1 values, highlight and select Pos1, move the Master channel control (stick, lever or switch) in one direction and set the percentage and then move the Master channel control in the other direction and set its value.

CLR Button - (Std. Prog Mixer)

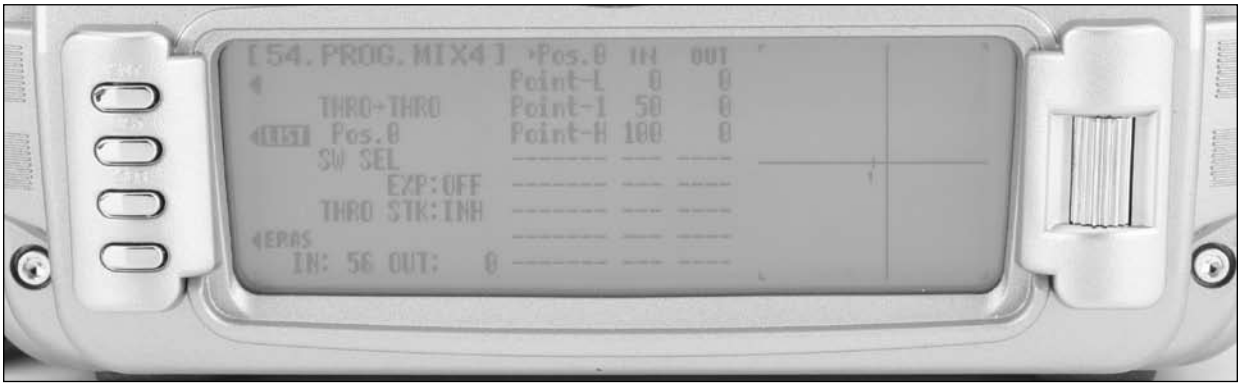
Note: Pressing the CLR button while a modifiable parameter is selected will reset the parameter to its default value. Pressing the CLR button when either the Master or Slave is highlighted Inhibits the entire mixer and it is no longer functional.

To Inhibit a Mix

Highlight either the Master or Slave and press the CLR button to completely disable a mixer.

Multi-Point Programmable Mixer

There are 5 Multi-Point Programmable Mixers in the 12x, Prog. Mix4 thru Prog.Mix8. They differ from the standard mixes in that they allow non-linear mix response from the Master to the Slave. This is possible because the mixer uses up to 8 points to define the position of the slave channel relative to the Master channel at up to eight selectable points. As the Master reaches each point, the Slave response position can be defined independent of other point settings.



Master Channel

The Master channel is the primary channel, lever or trim lever. The Master channel is selected by highlighting and selecting this parameter to obtain a list of channels and then selecting the Master channel from the list.

There are 4 channels that appear more than once. They are Throttle, Aileron, Elevator and Rudder. Since these channels can be influenced by Dual Rate, Exponential, and Throttle Curve settings, they are included in the list twice - once where the D/R and EXP settings are in effect and again where the D/R and EXP settings are ignored. The second time they are listed, there is a special designator to indicate that these channels can also be used as a Master while bypassing any Dual Rate and Exponential settings that may be associated with them. They are designated by "#" (pound sign) in front of the name - #FLP, #AIL, #ELE, and #RUD. When one of these channels is selected as the Master, all D/R, EXP and Curve settings associated with the Master are ignored during the mixing operation. Instead, the mixer reads only the physical position of the stick to perform mixing.

A (+) behind the channel indicates a trim include function. By selecting a channel with the (+) the trim lever affects both the master and slave channels.

Slave Channel

This is the Slave channel that will move according to the program mix in relation to the Master channel.

The Slave channel is selected by highlighting and selecting this parameter to obtain a list of channels and then selecting the Slave channel from the list. The list contains each of the 12 channels in the system.

Point Names/Numbers

The points that can be adjusted are listed vertically by name and are also displayed by number along the bottom of the graph.

Change the value of a point by highlighting and selecting the point name and dialing-in the desired percentage.

Current Point Setting

This list shows the setting for each of the 8 adjustable points (Point-L, 1, 2, 3, 4, 5, 6, 7, H). The value of each point determines where the point is positioned vertically on the graph, which dictates the Slave servo position relative to the master. The point values can be set from -100 to +100. A value of 0 indicates the Slave's center or neutral position. The overall travel of the slave channel is affected by the Travel settings described in the TRVL ADJ. function.

The value for a point can be changed by highlighting and selecting the Point Name to the left of the point value and then dialing-in the desired value.

Pressing the CLR button when a point value is highlighted resets the point to original settings. The original settings are:

Vertical Line

The Vertical line on the graph shows the current Master channel position. When the Master channel is deflected fully in one direction, the line is to the extreme left over Point-L, when it is at neutral it is in the center over Point-1, and when it is fully deflected in the other direction, the cursor is at the extreme right of the graph over Point-H. Where the vertical line intersects the Curve/Line over a given point defines Slave servo position, which is equal to the value assigned to that point.

Multi-Point Programmable Mixer

Graph

The graph illustrates the mixing curve. The X-Axis (horizontal plane) represents Master channel movement. The Y-Axis (vertical plane) represents the Slave servo movement where the bottom 1/2 of the graph is one direction from neutral and the top portion of the graph is the other direction.

Points That Can Be Added and Adjusted

Curve mixes are defaulted to three points (L, 1 and H). Up to five additional points can be added. To add a point, move the master channel in the desired position until STR appears on the left bottom of the screen. Pressing STOR will store a new point at that position.

Note: To eliminate a point press ERAS (bottom left of the screen) when the point is highlighted.

Exponential

The Exponential function blends the Curve between the points on the graph to provide a smooth response. The default value is OFF. To turn it on and smooth the mixing curve, highlight and select OFF and it will toggle to ON.

Slave Channel Position

The Slave servo position next to OUT at the bottom left of the display is expressed in values from -100 to +100, with 0 being neutral or center. It represents the servo travel that corresponds to the present Master channel position.

Master Channel Position

The Master channel position is shown on the bottom line of the display next to IN and is expressed in values from 0 to 100 with 50 being the center or neutral position. It represents the present Master channel position.

Switch Select

There are numerous switches that can be used to switch between the Pos0 and Pos1.

> **Note**: If the upper and lower settings for Pos0 or Pos1 are left at 0% the mixer can be turned on and off with the switch. In addition, if Flight Modes are activated in the Devic.SEL function, then flight mode switches may be selected. Also Switch positions can be used to select between Pos0 and Pos1.

To select a switch that will switch between the Pos0 and Pos1 values, highlight and select the switch name and it will toggle between Pos0 and Pos1.

CLR Button

Pressing the CLR button while a modifiable parameter is selected will reset the parameter to its default value.

> **Note**: Pressing the CLR button when either the Master or Slave is highlighted inhibits the entire mix.

LIST Button

Press the LIST button to return to the FUNCTION List, or rotate the rotary selector until LST appears next to LIST and select it to return to the SYSTEM Menu.

ENT Button

Pressing the ENT button returns to the Main Display.

TO Inhibit a Mixer (turn it off entirely)

Highlight either the Master or Slave and press the CLR button to completely disable a mixer.

67: Aileron-to-Flap Mix

Aileron-to-Flap mix causes the flaps to move in unison with the ailerons. This function gives added roll response by mixing ailerons to flaps such that the entire trailing edge functions as an aileron.

Note: This function is only available when Dual Flap is assigned in the Wing Type function.

To access Aileron-to-Flap mix, in FUNC.LIST rotate the Selector until AIL→FLP M is highlighted. Press the Selector to access the Aileron-to-Flap mix.

Note: Two Aileron-to-Flap mix values are available—Pos0 and Pos1. Switches are available at the right of the screen that allow the selection of Pos0 or Pos1.

Note: Position 1 always has priority over position 0. Press the LIST button to return to the Function Mode screen.

68: Pitch Curve

The Pitch Curve is used to control variable pitch propellers. The Pitch function works nearly identically to a programmable curve mix, allowing up to 8 points to be stored and adjusted throughout the curve. Two curves are available (Pos0 and Pos1) and are selectable with various switches, flight modes, throttle position or Stick positions (SPS). An Exponential function is available that smooths the pitch curve. Pitch must be assigned to Gear, Aux2 or Aux 3 channels in device select to be able to access the Pitch function. The Pitch curve mixes the throttle channel to the channel that is selected as PIT in the device select mode.

Note: PIT (Pitch) must be selected in Device select for the GEAR, AUX2 or the AUX 3 channel to allow access to the Pitch Curve Function.

Point Names/Numbers

The points that can be adjusted are listed vertically by name (Point-L, 1, 2, H, etc.) and are also displayed by number on the graph.

Change the value of a point by highlighting and selecting the point name and adjusting the desired percentage.

Current Point Setting

This list shows the setting for each of the 8 adjustable points (Point-L, 1, 2, 3, 4, 5, 6, H). The value of each point determines where the point is positioned vertically on the graph, which dictates the Pitch servo position relative to the throttle. The point values can be set from 0 to +100.

The value for a point can be changed by highlighting and selecting the Point Name to the left of the point value and then adjusting the desired value.

Pressing the CLR button when a point value is highlighted resets the point to original settings.

Vertical Line

The vertical line on the graph shows the current throttle channel position. When the throttle channel is deflected fully in one direction, the line is to the extreme left over Point-L, when it is at neutral it is in the center over Point-1 and when it is fully deflected in the other direction the cursor is at the extreme right of the graph over Point-H. Where the vertical line intersects the Curve/Line over a given point defines the pitch servo's position, which is equal to the value assigned to that point.

Graph

The graph illustrates the pitch curve. The X-Axis (horizontal plane) represents throttle channel movement. The Y-Axis (vertical plane) represents the Pitch servo movement.

Points That Can Be Added and Adjusted

The Pitch Curve is defaulted to three points (L, 1 and H). Up to five additional points can be added. To add a point, move the throttle stick in the desired position until STOR appears on the left bottom of the screen. Pressing STOR will store a new point at that position.

Note: To eliminate a point press ERAS (bottom left of the screen) when the point is highlighted.

Exponential

The Exponential function blends the Curve between the points on the graph to provide a smooth response. The default value is OFF. To turn it on and smooth the mixing curve, highlight and select OFF and it will toggle to ON.

Pitch Channel Position

The Pitch servo position next to OUT at the bottom left of the display is expressed in values from 0 to +100. It represents the servo travel that corresponds to the present Throttle Channel position.

Throttle Channel Position

The Throttle channel position is shown on the bottom line of the display next to IN and is expressed in values from 0 to 100 with 50 being the center or neutral position. It represents the present Throttle channel position.

Switch Select

There are numerous switches that can be used to switch between the Pos0 and Pos1. Note: if the upper and lower settings for Pos0 or Pos1 are left at 0% the mixer can be turned on and off with the switch. In addition, if Flight Modes are activated in the Devic.SEL function, then flight mode switches may be selected. Also Switch positions can be used to select between Pos0 and Pos1.

To select a switch that will switch between the Pos0 and Pos1 values, highlight and select the switch name and it will toggle between Pos0 and Pos1.

CLR Button

Pressing the CLR button while a modifiable parameter is selected will reset the parameter to its default value.

Note: Pressing the CLR button when either the Master or Slave is highlighted will inhibit the entire mix.

LIST Button

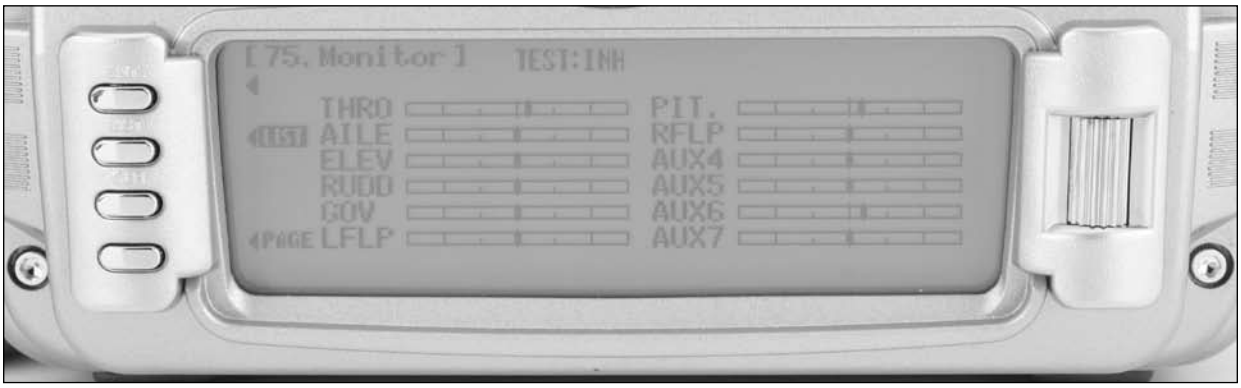
Press the LIST button to return to the FUNCTION List, or rotate the rotary selector until LST appears next to LIST and select it to return to the SYSTEM Menu.

ENT Button

Press the ENT button to return to the Main Display.

75: Monitor

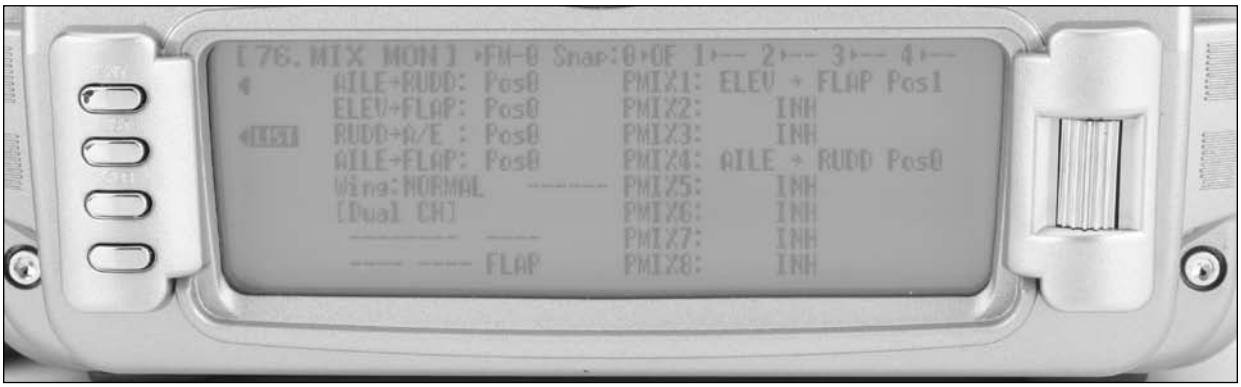
The Monitor screen displays each channel and shows the movement of channels when sticks, levers and switches are moved. It renames channels according to special assignments to assist in identifying each channel. For instance, when Flaperon is the wing type, the Monitor will display RAIL for right Aileron and LAIL for left Aileron instead of displaying channel 2 and channel 6. The Monitor function also displays the current value of all digital trims



1. To access the Monitor function, highlight and select MONITOR in the FUNC.LIST to obtain the Monitor display.
2. The default display shows the graphical positions of all channels. To view the digital trim positions for all trims, highlight and select PAGE. View both displays while moving sticks, switches and trim levers to see the movements of various channels and trims.

76: Mix Monitor

The Mix Monitor screen displays all the mixes, dual channels, wing types and snap roll functions. This screen is a convenient way to determine which functions are activated.



1. To access the Mix Monitor screen, highlight and select MIX MON in the FUNC.LIST to obtain the Mix Monitor display.

78: Trainer

The 12X features a programmable Trainer System that allows the instructor to transfer some or all of the primary flight control functions (Throttle, Aileron, Elevator and Rudder) to the student. It also allows for indicating if the transmitter (Tx) is to be the Master (controlled by the instructor) or Slave (controlled by the student). The right or left trim lever is used to transfer control to the student when the 12X is being used as the Master/Instructor transmitter.

All Dual and Expo rates, Gear, and flap positions are controlled by the Master Tx. Only the Throttle, Aileron, Elevator and Rudder channels are transferred to the Slave transmitter.

Note: The Slave transmitter battery must be charged.

1. Connect the Trainer cord between the Master and Slave transmitters. Turn the power on to the Master transmitter (the Slave Tx remains powered off and can even have the module removed).
2. If the slave radio is a 72MHz system, make sure the Slave Tx is in the PPM/FM modulation mode. If the slave system is a 2.4 DSM, this does not apply.
3. Highlight and select Trainer in the FUNC.LIST to obtain the Trainer Display.

12X Used as Master (Instructor)

1. If the 12X is being used as the Master Tx (the Tx operated by the instructor), select the channel(s) that are to be operated by the Slave Tx (Tx operated by the student) when the trainer switch is depressed.

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

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

The 12X is now ready to be used as the Master or instructor Tx. Depress the Left trim lever to transfer control to the student. Control will remain transferred until the Left trim lever is released.

12X Used as Slave (Student)

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

The 12X is now ready to be used as the Slave or student Tx.

87: Timer

The 12X features a sophisticated Timer System with three timers. An integrated timer keeps track of total Tx-on time for the current selected model and integrated time is displayed on the Main display. Two other timers can be configured as Countdown timers or as Stopwatches. These timers also appear on the Main display when active and can be started and stopped via various switches. In addition an interval function can be programmed such that alarm will sound at preprogrammed intervals. A Down Alarm can be programmed that will sound an alarm prior and up to the programmed count down time and a one-time function sounds the alarm once, or continuously, when the time is reached.

1. To configure the timers, highlight and select Timer in the FUNCTION LIST to obtain the Timer display.
2. Highlight and select INH under TIMER1 or TIMER2 and then select DOWN-T of STOP W. Use the Selector to set the countdown set time, interval, down alarm and one time functions. Once the timer is set, TIM will appear on the Main display in the lower left corner. The timers can be programmed to several different buttons or switches. Use the Selector to highlight the desired button or switch to operate the timer. Press the Selector to confirm the selection. The desired set time, beep interval, down alarm can be set as desired. When the One Time function is ON, the timer will start with the switch selected, but pressing the switch again will have no effect. If the One Time function is OFF, the timer can be stopped and restarted as many times as desired with the switch selected.
3. To Reset the Integrated Timer, highlight and select the time under INTEG-T and Push [CLR]=0:00 appears on the display. Press the CLR button to the left of the display to reset the integrated timer.

   Note: To reset the stopwatch or countdown timer, use the roller to highlight the Stop or Down then press the CLR button.

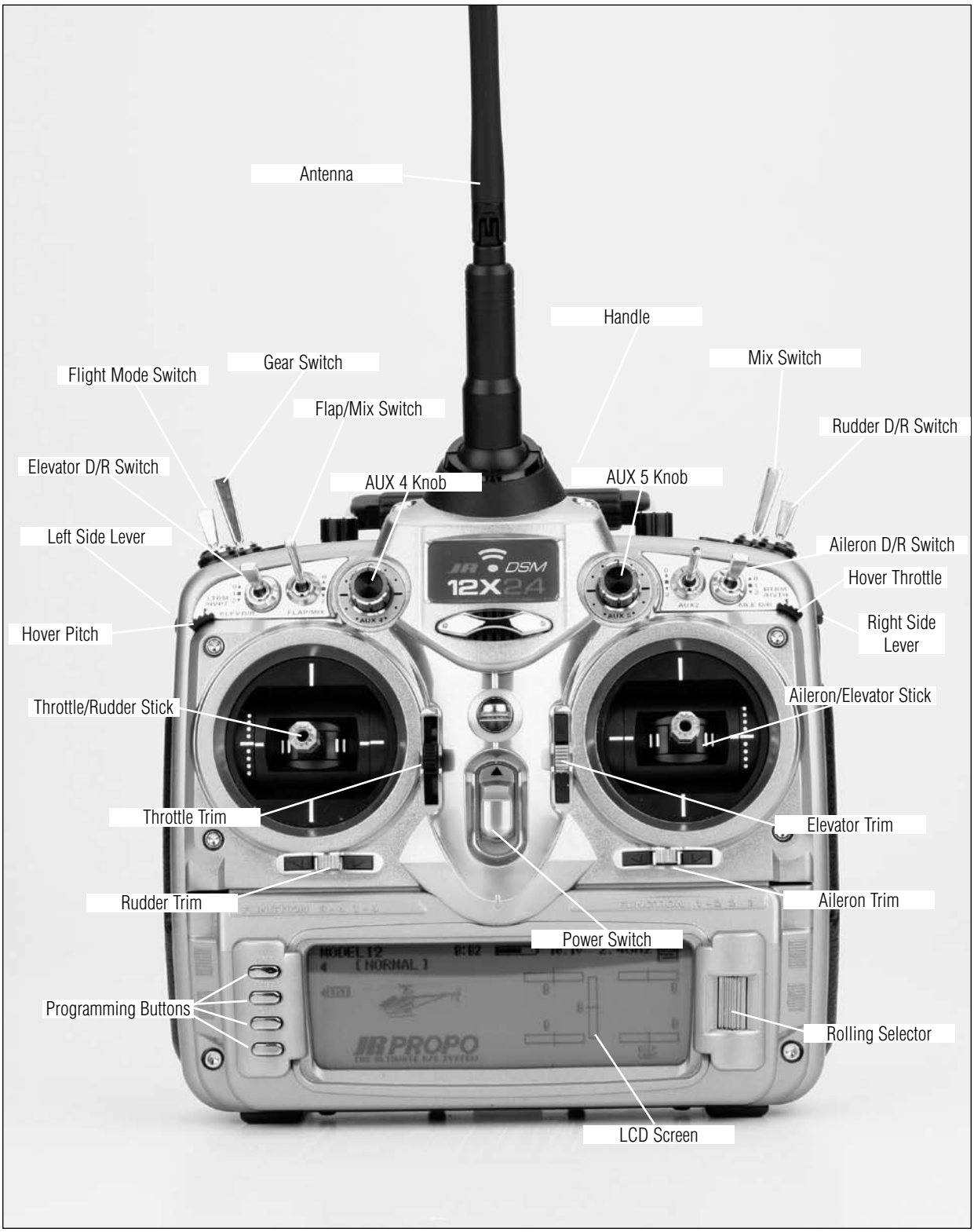
12X Helicopter Mode

Introduction

The 12X Heli Mode programming is designed for model helicopters and includes 6 swashplate types making it compatible with virtually every type of helicopter. The 12X Heli program contains a host of sophisticated features. These features include:

- Switch Assignability for channels and functions
- 50-model memory
- Up to six fully programmable Flight Modes
- Flight Mode Naming allows custom naming of each flight mode.
- Warning system allows custom programming of alarms for various switch and stick positions
- Programmable Servo Speed
- Triple Rates/Exponentials (up to 6 Rates EXPOs for Aileron, Elevator and Rudder in flight modes)
- 6 Swashplate Types (normal, 2 servo 180, 3 servo 120, 3 servo 140, 3 servo 90, 4 servo 90)
- Electronic 3D Cyclic Ring prevents overdriving the cyclic servos with combined aileron and elevator commands
- Adjustable Trim Rates (10 – 100 trim steps)
- Aileron to elevator and elevator to aileron mixing
- Built-In Cyclic-to-Throttle Mixing for Aileron, Elevator, and Rudder
- Governor Mix with up to five programmable values
- Throttle Curves (up to 5) with up to 8 programmable points
- Pitch Curves (up to 6) with up to 8 programmable points
- Gyro System (In Flight mode Gain Selection of up to 6 gains)
- 8 Programmable Mixes (includes 5 multi-point and 3 standard mixes)
- Programmable trainer system (selectable channels for Student Control)
- 3 programmable timers that can be triggered w/ the throttle position or programmable switches
- Servo Monitor (automatically renames channels according to assignments)
- Mix Monitor displays all active mixes

Pilots that have previous experience programming JR radios may feel confident programming the 12X without referring to the manual. Many of the functions and programming features operate similarly to JR's 9303 and 10X radios. The Heli section of the manual is presented in the same order as the functions appear in the transmitter beginning with the System Menu functions and then the Function Menu functions.



Rudder D/R
AUX 7 Knob
Handle
AUX 6 Knob
Left Lever
Right Lever
Throttle Spring Tension Cover
Elevator Spring Tension Cover
Bind/Range Check Button
Trainer/transfer/PC Interface Jack
Rudder Spring Tension Cover
Aileron Spring Tension Cover
Charge Jack
Battery Door
JR/DSM
12X24
2.4GHz

System Mode

System mode contains the foundational programming that is normally only used when first setting up a helicopter. System mode functions include: model select, model name, model reset, Swashplate type etc.—functions that are typically set once during setup and then are seldom changed or adjusted. Below and throughout this section the functions are in the order that they appear in the System Mode List.

To Enter System Mode

Press ENT and hold while turning on the transmitter.

The screen should appear as follows:

System Mode List

System mode contains the follow screens:

84: Model SEL	Model Select	Page H-6
81: MDL Name	Model Name	Page H-8
28: MDL Reset	Model Reset	Page H-8
89: Type SEL	Type Select	Page H-9
85: MODULAT.	Modulation (12X MV System Only)	Page H-10
93: Freq SEL.	Frequency Select (12X MV System Only)	Page H-10
83: Trim SYS.	Trim System	Page H-12
91: STK Pos SW	Stick Position Switch	Page H-14
92: FM Name	Flight Mode Name	Page H-15
86: Transfer	Model Transfer	Page H-16
97: Warning	Warning	Page H-18
98: Settings	Settings	Page H-19
17: Device SEL	Device Select	Page H-20
34: Swash TYP	Swashplate Type	Page H-26

FUNCTION MODE

Function Mode contains programming functions that are used to complete the setup and then used to adjust and fine-tune how the helicopter flies. Below and throughout this section the functions are in the order that they appear in the Function List.

To Enter Function Mode

Press the LIST button after the transmitter is powered-up to obtain the Function List.

Function Mode List

Function Mode contains the follow screens:

11: REV. SW	Reverse Switch	Page H-27
12: TRVL ADJ.	Travel Adjust	Page H-28
13: D/R & EXP	Dual Rate and Exponential	Page H-29
15: Sub Trim	Sub Trim	Page H-30
16: THRO Hold	Throttle Hold	Page H-31
18: THRO CURV.	Throttle Curve	Page H-32
24: SRV. Speed	Servo Speed	Page H-34
42: MIX-THRO	Mix Throttle	Page H-35
44: Gyro SENS	Gyro Sensor	Page H-36
45: Governor	Governor	Page H-37
47: Tail CURV	Tail Curve	Page H-38
61: Dual PIT.	Dual Pitch	Page H-39
65: Swash MIX	Swashplate Mix	Page H-40
68: PIT. CURV	Pitch Curve	Page H-42
51: PROG. MIX1	Program Mix 1	Page H-44
52: PROG. MIX2	Program Mix 2	Page H-44
53: PROG. MIX3	Program Mix 3	Page H-44
54: PROG. MIX4	Program Mix 4	Page H-44
55: PROG. MIX5	Program Mix 5	Page H-44
56: PROG. MIX6	Program Mix 6	Page H-44
57: PROG. MIX7	Program Mix 7	Page H-44
58: PROG. MIX8	Program Mix 8	Page H-44
75: Monitor	Monitor	Page H-52
76: MIX MON	Mix Monitor	Page H-52
77: Fail Safe	Fail Safe (12X MV System Only)	Page H-52.5
78: Trainer	Trainer	Page H-53
87: Timer	Timer	Page H-54

System Mode

Programming a new model generally begins by accessing the SYSTEM Mode List. System Mode is where models are selected, the model type is chosen (airplane, helicopter or sailplane) and other high-level information is programmed. It is also used to activate some of the more advanced programming features such as Flight Modes, Switch Assignments and Swashplate Types.

Accessing the System Mode

1. The System Menu [System Mode List] is obtained by holding down the ENT button while turning the transmitter on.

84: Model Select- (Copy Function)

Model Select allows the programming parameters for up to 50 different models to be stored and selected in up to 50 individual model memories. This screen also allows a model to be copied from the current selected model to any of the other 49 available internal model memories (model copy).

Note: When setting up a new model it is recommended that an unused model memory is selected. If a current model memory is selected, it's recommended that the model be reset to factory default setting before programming the new model. See Model Reset page H-8.

To Select a Model Memory

1. In the System MODE, highlight and select Model SEL using the rolling Selector.
2. Use the rolling Selector to highlight MODEL then press the roller and select the desired model number to be used using the rolling selector.
3. Return to the System Menu by pressing the LIST button.

Model Copy

Making a backup copy of the model memory protects against losing the original program and also allows one to experiment with the original program, knowing that the original settings can be restored by copying the backup copy back to the original model memory.

To Copy a Model to Another Internal Memory

1. In the System MODE, highlight and select Model SEL using the rolling Selector.
2. Use the rolling Selector to highlight Select then press the roller to access model select.
3. Rotate the roller to select the desired model memory that you wish to copy the current program to. (1-50)
4. Press the roller to select the highlighted model that you wish to copy to.
5. Press the COPY button to copy the current model list above to the selected model listed below.
6. Return to the System Menu by pressing the LIST button.

Note: The model memory that is copied to will be replaced with the current model memory programming. It is recommended that a model memory that is not being used be selected to "copy to" as the information in that memory will be erased and replaced with the current model memory during copying.

81: Model Name

The model name screen allows each model to be given up to a sixteen digit name or number. This is convenient for identifying a model. The model's name will appear on the main info screen.

To Name a Model

1. In the System Menu, highlight and select MDL Name using the Selector.
2. Using the roller position the cursor (indicates where the next character will be placed) at the beginning of the model name. Press the Selector to obtain a list of available characters.
3. Highlight and select the desired character to form the model name. After the character is selected, rotate the Selector to position the cursor where the next character is to be placed and press the Selector to obtain the character list again. Repeat until the model name is completed.
4. Return to the System Menu by pressing the LIST button.

28: Model Reset

Model Reset is used to reset all programming to factory default settings. When setting up a new model it is important to reset all parameters to their default or factory settings before proceeding with any other programming. This is to ensure that there are no programming values or functions active from a previous model or programming session.

To Reset a Model Memory

1. In the System MODE, highlight and select MDL Reset using the Selector.
2. Press the CLR button that is next to RES on the display.
3. Press the lowermost button next to YES on the display to reset all data for this model.
4. Return to the System Menu by pressing the LIST button.

89: Type Select

Type select allows the model type to be selected. Model types include HELI (helicopter), ACRO (airplane) and GLID (glider).

> **Note**: When changing model types, the programming information will be reset to the factory default setting losing the previous settings.

To Select a Model Type

1. In the System Menu, highlight and select Type SEL using the Selector.
2. Highlight and select HELI using the Selector and press the selector to access the HELI mode.
3. Return to the System Menu by pressing the LIST button.

85: Modulation - (12X MV System only)

Note: This function is only available on the 12X MV version and only when the TSM-72A 72MHz module is plugged in.

Important: When the 72MHz module is plugged in and the system is turned on, the antenna must be attached. Operating the 72MHz module without the antenna attached could overload the internal transistor causing a failure.

Warning: Only the JR TSM-72A and JRM2.4 modules are compatible with the 12X MV. Do not install a standard-type JR, Spektrum or other branded module in the 12X as damage will occur.

The 12X MV version radio system allows the RF module to be replaced allowing the system to operate on 72MHz or 2.4GHz. Note that the transmitter automatically detects which module is installed and modifies the accessible programming appropriate to the module selected.

The Modulation screen (code 85) allows the selection of modulation for 72MHz receiver types. Modulation types available are:

APCM - JR's newest version PCM

SPCM - Most current available JR PCM receivers use this type of modulation

ZPCM - Compatible with older JR receivers

PPM - FM modulation

Note: It's important to select the modulation to match the receiver type. JR receivers have the modulation type printed on the receiver.

To Program a Modulation Type

1. In the SYSTEM Menu, highlight and select Type MODULAT. using the Selector.
2. Highlight and select the currently selected modulation type (APCM) using the Selector and press the selector to access all available modulation types (APCM, SPCM, ZPCM, PPM).
3. Rotate the roller to highlight the desired modulation type then press the roller to select the modulation type.
4. Return to the SYSTEM Menu by pressing the LIST button.

93: Frequency Select- (12X MV system only)

Note: This function is only available on the 12X MV version and only when the TSM-72A 72MHz module is plugged in.

Important: When the 72MHz module is plugged in and the system is turned on, the antenna must be attached. Operating the 72MHz module without the antenna attached could overload the internal transistor causing a failure.

Warning: Only the JR TSM-72A and JRM2.4 modules are compatible with the 12X MV. Do not install a standard type JR, Spektrum or other branded module in the 12X as damage will occur.

The 12X MV version radio system allows the RF module to be replaced allowing the system to operate on 72MHz or 2.4GHz. Note that the transmitter automatically detects which module is installed and modifies the accessible programming appropriate to the module selected.

The Frequency Select function allows the selection of 72MHz channels 11 thru 60 when the 72MHz module is installed. This screen displays the channel and corresponding frequency.

To Select a Frequency

1. In the SYSTEM Menu, highlight and select Type FREQ SEL. using the Selector.
2. Highlight and select the currently selected channel using the Selector and press the selector to access all available channels.
3. Rotate the roller to select the desired channel then press the roller to select that channel. The selected channel will be displayed on the main screen every time the transmitter is turned on and RF-ON or RF-OFF will be displayed on the left side of the screen. To transmit press RF-ON.

83: Trim System

The Trim System function adjusts the sensitivity of the 12X trims, hovering throttle and hovering pitch trim levers and the high pitch lever. The digital trims are adjustable from 0–10 with 10 being the coarsest adjustment and 0 being trim off. Adjusting the digital trim values has no effect on the total trim travel (unless 0 is selected), however, it affects the resolution of each trim input. When the value is set to 10, each click of trim adjusts the servo output by 10us and there are only 10 trim increments from center to each end. When set to 5, the output is changed 5us per trim step and there are 20 trim increments from center to each end. When set to 1, each click of trim changes the servo output by 1us and there are 100 trim increments. When set to 0 the trim levers cease to function effectively turning off the trim function. The right and left trim levers Are adjustable from 0 to 200 and can be turned on/ off. When adjusted to above 100% the trimmer functions as a three-position switch. Reducing the value increases the number of output positions.

When adjusting the digital trims (AILE, ELEV, RUDD), the total trim travel does not change – only the number of increments (beeps) changes, which makes for finer or coarser trim movements. When adjusting the analog throttle trim, and the high pitch trim, however, the total trim travel is actually reduced when set to less than 100%.

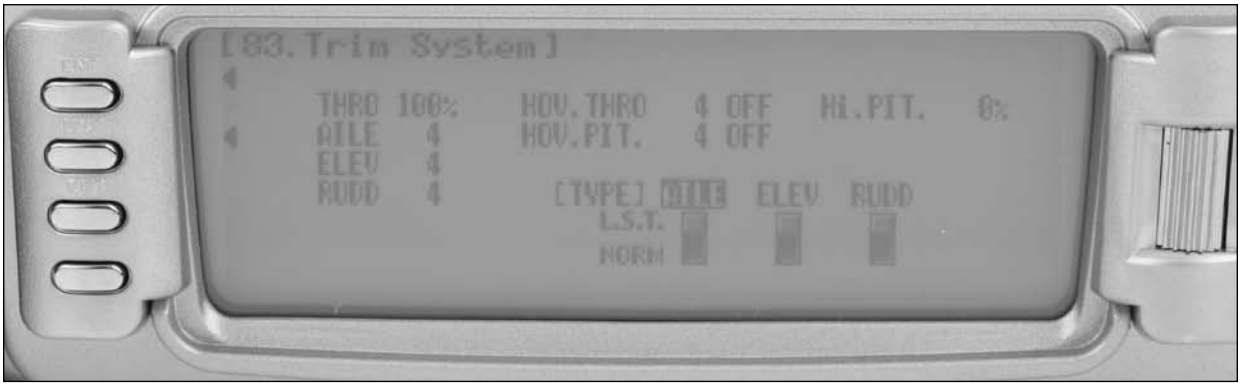
It is recommended to use a fairly coarse setting, such as the factory default 4, when test flying a model for the first flights in order to be able to trim it quickly, and then use a finer setting, such as 3–1, for final precision trimming.

LST Trim

The LST trim feature has two options, LST and normal. In normal, when making trim changes using the Aileron elevator or rudder digital trims, the center as well as the end points is affected by the trim values (i.e. right trim causes the center, the right end point and the left end point to all shift to the right). When LST is activated, only the center position is trimmed (i.e. the center is shifted to the right but the end points are not affected). This is useful for helicopters that have a hard stop end point to prevent over travel caused by trim or if it's desired to have trim changes not affect the total roll pitch or yaw rate. LST trim is normally turned on for helicopters.

To Adjust the Trim Rates

1. Highlight and select TRIM SYS. in the SYSTEM MODE to acquire the Trim System function.
2. Highlight and select the trim that is to be changed and use the Selector to set a value of 1–10 (1 = finest, 10 = coarsest; Note: the Flap and AUX trims can be turned off or on by selecting On or Off).
3. Repeat for other trims as desired.



To Select the LST Trim Function

1. Highlight and select the desired channel (AILE, ELEV or RUDD) next to (TYPE) LST and press the roller to select LST or NORM.
3. Repeat for other channels as desired.

91: Stick Position Switch

The Stick Position Switch function allows the throttle, aileron elevator or rudder stick positions to be preprogrammed to turn on/off mixes or the timer. Four stick position programs are available and one or more can be assigned to various mixes or functions. The stick position that turns the Stick Position switch on/off is selectable as well as the direction to turn on/off. Also a symmetrical option is available that allows the function to be turned on with a preprogrammed equal right or left (up or down) stick position.

To Program a Stick Position Switch

1. In the SYSTEM MODE, highlight and select STK PosSW using the Selector.
2. Highlight the desired Stick position switch that you desire to use (SPS0, SPS1, SPS2, or SPS3) and press the roller.
3. Select the desired channel that will be used to trigger the Stick position (Throttle, Aileron, Elevator, Rudder).
4. Rotate the roller to select POS and adjust to the desired value that you wish to have the mix function turn off/on (0 = center, L100= left full stick travel, etc.

   Note: ON/ OFF is displayed at the top of the screen and when moving the stick this will indicate that the function is working).
5. Use the roller to select ON and select Low/ High or Right / Left to access the desired direction that the function will turn on/off.
6. A symmetrical function is available that allows the stick position to be turned on/off as the stick is displaced symmetrically in either direction. It's necessary to first program a value in the POS then highlight the SYM and activate it using the roller. The center can now be programmed to turn on or off by selecting the ON and highlighting Low/ High or Right /Left.

   Note: The above procedure establishes the base for turning on/off mixes, change throttle curves, change differential rates, etc. To program the stick position it's necessary to go to the desired function in Function mode and select SPS0, SPS1, SPS2 or SPS3 under SW (switch) in that specific function.
7. Return to the SYSTEM Menu by pressing the LIST button.

92: Flight Mode Name

The Flight Mode Name program allows each flight mode to be custom named with up to six characters. On the main screen an abbreviated name of up to four characters will be automatically displayed when that flight mode is selected. Examples for flight mode names may include START, 3D, STUNT2, HOVER, etc.

To Program a Flight Mode Name

1. In the SYSTEM MODE, highlight and select FM Name using the Selector.
2. Highlight the desired flight mode character position using the roller then press the roller to access the list of the available characters.
3. Highlight and select the desired character to form the flight mode name. After the character is selected, rotate the Selector to position the cursor where the next character is to be placed and press the Selector to obtain the character list again. Repeat until the flight mode name is completed.
4. Use the roller to highlight the * below the flight mode name and press the roller to select up to four characters from the above flight mode to be automatically displayed on the main screen when that flight mode is selected.
5. Return to the SYSTEM Menu by pressing the LIST button.

86: Transfer

The TRANSFER function allows one 12X transmitter to transfer a model memory for a specific model to another 12X transmitter. This function is also used to transfer a model memory to the included PC date transfer allowing unlimited model memory storage and backup of your model's programming. (See page H-16 for details on using the PC data transfer.) The Transfer function is also used to receive data from another 12X or from the PC Data Transfer.

Note: The sending and receiving transmitters must both be 12X's, or the PC Data Transfer device and a 12X. Transfer is not possible with any other system.

Preparing the 12X to Receive a Model Transfer

1. Hold the ENT button while plugging the DSC cord into the back of the transmitter to obtain the SYSTEM List. Plug the other end of the DSC cord into another 12X transmitter while holding the ENT button and after the following, prepare that transmitter for transfer send as described above.
2. Highlight and select TRANSFER in the SYSTEM Menu to obtain the Transfer display.
3 If RECEIVE is already displayed, continue with the next step. If TRANSMIT is displayed, highlight and select TRANSMIT, changing it to RECEIVE.
4. Select the model memory that is to receive the data by highlighting and selecting the model name/memory number and then scrolling to and selecting the model memory that is to receive the data. Select an unused model memory or a memory that contains data for a model that is no longer needed as the data in this model memory will be replaced by the model memory that is transferred and will be permanently lost.

Note: The receiving model name/memory number cannot be the currently selected model. If you wish to receive a model in the currently selected model name/memory number, go to the model select function and select a different model, then reenter the transfer function and follow the instructions above.

5. Press START on the left side of the display. Stand-by appears at the bottom of the display indicating that the system is ready to receive data. Follow the next steps to prepare the sending transmitter for memory transfer.

1. With the other end of the trainer cord plugged into the sending 12X transmitter in SYSTEM List as described in step 1 above, highlight and select TRANSFER (code 86) in the SYSTEM Menu to obtain the Transfer display.
3. The model to be transferred must be the currently selected model. If the model to be transferred is not currently selected, see Model SEL in the SYSTEM Menu to select the model to be transferred.
4. When the receiving 12X is ready, press START on the left side of the display. The data for the currently selected model is transferred to the receiving device.

97: Warning

The Warning function can be programmed to sound an alarm if a selected flight mode, switch positions or throttle stick position is in an inappropriate position when the transmitter is turned on. For example, if another flight mode is selected other than normal when the transmitter is turned on, an alarm can sound warning that the switch is in an inappropriate position to start the helicopter. Or if the throttle is above a preprogrammed position when the transmitter is turned on an alarm will sound warning of an unsafe throttle position for startup. Stick positions can also be programmed to sound alarms. See page H-14 for programming stick position switches. Note that during the warning no signal is being transmitted. Flight Modes 1 and 2 and the Throttle stick are defaulted with a warning above 10%, and an alarm will sound and no signal will be transmitted if the throttle is above 10% when the transmitter is turned on. The warning function is available for the following:

- Flight Mode Normal
- Flight Mode 1
- Flight Mode 2
- Flight Mode 3
- Flight Mode 4
- Hold
- Gear Switch
- AX21
- AX22
- RUD1
- RUD2
- Stick Position Switch 0
- Stick Position Switch 1
- Stick Position Switch 2
- Stick Position Switch 3
- Throttle Stick Position

To Program a Warning

1. In the SYSTEM Menu, highlight and select Warning using the Roller.
2. Highlight the desired flight mode, switch position or stick position switch (SPS), then press the roller to turn ON/OFF that function as a warning.

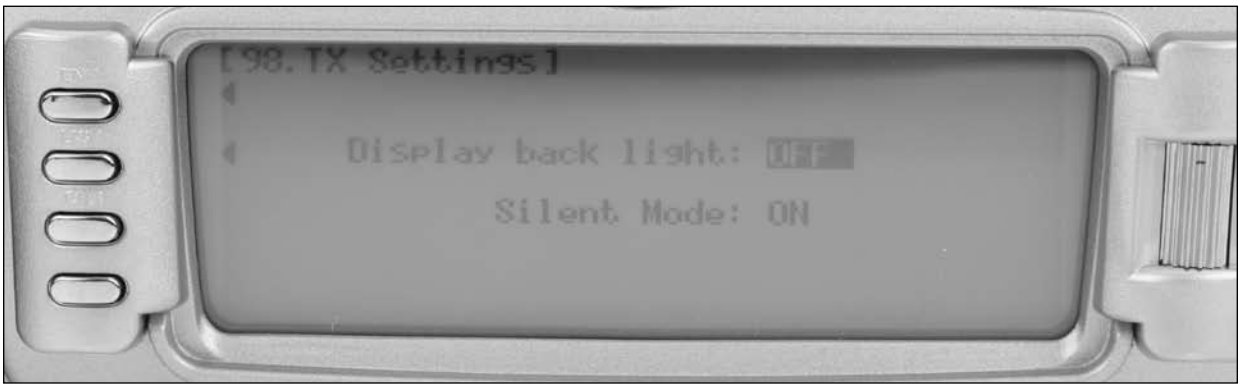
   Note: It is possible to activate multiple functions as a warning.

   Note: To select a Stick Position Switch as a warning it is first necessary to activate the stick switch. See Stick Switch Position Code 91 on page H-14 for more details.

3. If a throttle stick position is desired as a warning, highlight INH next to throttle and press the roller to activate the throttle stick position. Rotate the roller to select POS and adjust to the desired value that you wish to have the warning sound, note that 0= low throttle, 50 = 50% throttle, etc. ON/ OFF is displayed at the top of the screen and when moving the stick this will indicate that the function is on/ off. The throttle stick position warning comes default set to active with a position of 10.
4. Use the roller to select ON and select LOW or HI to have the alarm sound above or below the POS position.
5. Return to the SYSTEM Menu by pressing the LIST button.

98: Settings

The Settings program allows the screen backlight to be turned on/off or placed in auto (sleep) mode. This function also allows the audible beeper to be turned on or off. These functions are defaulted to Backlight Auto and Silent Mode off.



To Change Transmitter Settings

1. In the SYSTEM MODE, highlight and select Settings using the Selector.
2. Highlight the desired function. Display Back Light or Silent Mode using the roller then press the roller to access and change the settings.
3. Return to the SYSTEM Menu by pressing the LIST button.

17: Device Select

Device Select is used to activate some of the more advanced features of the 12X. The Device SEL function is used to activate/ inhibit or assign the following:

- Assign the flight mode switch
- Activate extra Flight Modes (4 and 5)
- Assign the Throttle Hold switch
- Select Stunt trim (common for all stunt modes or independent for each flight mode)
- Assign hovering pitch and throttle to analog knobs or digital switches
- Assign Switch, Lever and Knob assignments
- Activate/inhibit switches/channels
- Activate/inhibit the Governor function,
- Activate /inhibit the Gyro function
- Activate/inhibit the Pit2 (dual pitch servo) function
- Assign functions and channel to the desired switch knob or lever

Each of these options is described below:

Assigning the Flight Mode Switch

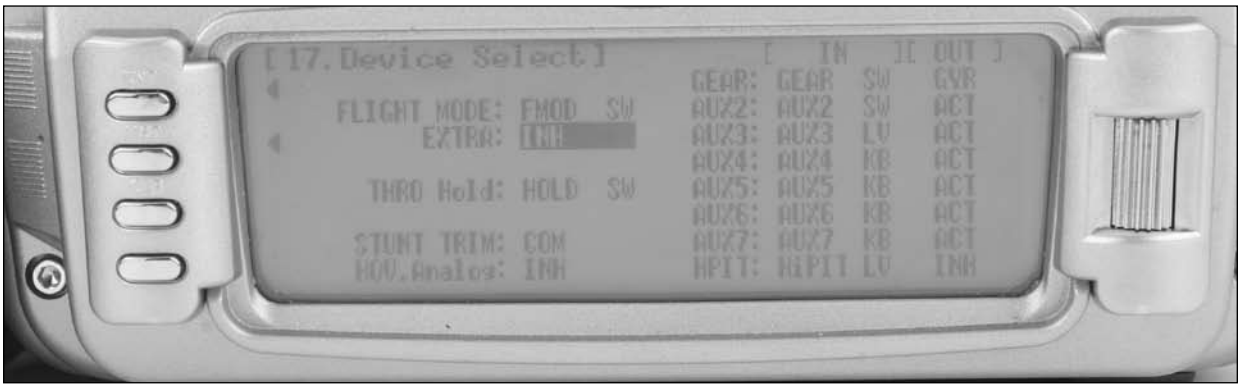
The 12X allows the user to assign the flight modes to the flight mode switch or the rudder dual rate switch. The system is defaulted with the flight mode on the flight mode switch (upper left corner of transmitter) and in most cases this position is recommended.

To Assign the Flight Mode to a Switch

1. In Device Select highlight and select FMOD. The screen will appear that allows the Flight Mode to be moved to the rudder Dual Rate Switch or the Flight Mode switch.
2. Using the roller, select the desired flight mode switch position.

Activating Extra Flight Modes 3 and 4

The 12X offers up to 6 separate flight modes. The system is factory defaulted to offer 4 flight modes (N, 1, 2, Hold) plus there are 2 additional flight modes, numbered 3 and 4 that can be activated through the Device Select function.



To Activate 2 Additional Flight Modes (Flight Modes 3 and 4)

1. In the SYSTEM MODE highlight and select Devic. SEL.
2. Highlight and select EXTRA using the Rolling Selector. When selected, a screen will appear allowing six switch options: INH, AIL D/R, ELE D/R, RUD D/R, HOLD SW and GEAR SW. Highlight and select the switch that is to be used to access Extra Flight Modes.

Once Extra Flight Modes have been activated, two additional sets of Throttle and Pitch curves numbered 3 and 4 will appear in the Function Mode.

Assigning the Throttle Hold Switch

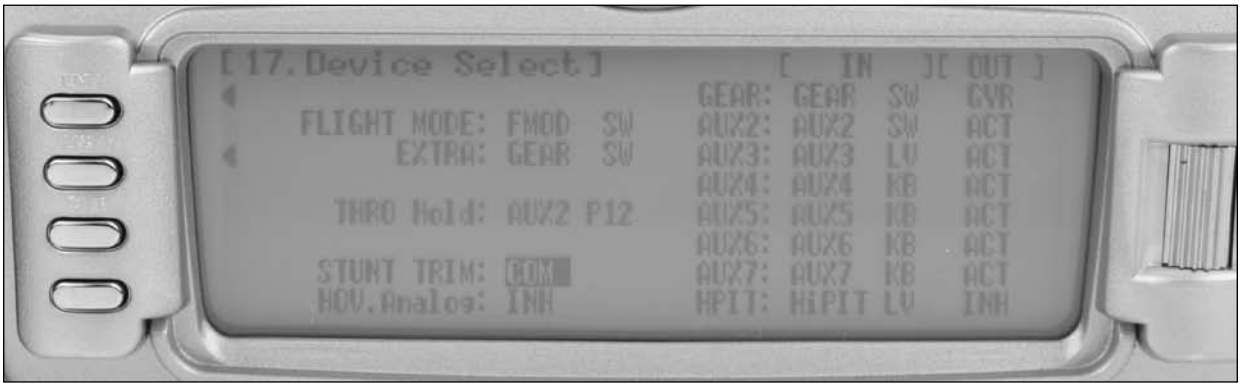
The 12X allows the user to assign the Throttle Hold function to one of ten switches. The system is defaulted with Throttle Hold on the Throttle Hold switch (back top right), and in most cases this position is recommended.

To Assign the Throttle Hold to a Switch

1. In device select highlight and select THRO Hold. The screen will appear that allows ten different switches to be assigned as the Throttle Hold switch.
2. Using the roller, select the desired switch to activate Throttle Hold.

Stunt Trim

The Stunt Trim function allows the pilot to choose between a common set of trims for all stunt modes (COM) or to allow each flight mode to have its own individual trims (FMOD).



The STUNT TRIM COM parameter can be toggled back and forth between COM and FMOD by pressing the Rolling Selector when COM or FMOD is highlighted. If FMOD is the selected mode, the digital trim for rudder, aileron and elevator is shared by all flight modes (i.e. making a trim change in any flight mode effects the trim in all flight modes). If COM is selected, the digital trims for all stunt modes (ST1, ST2, ST3 and ST4) are common, while Normal and Throttle Hold have their own trims.

Hover Analog

The Hover Analog function allows the pilot to select either the digital trim levers (HVTH and HVPT) or the Aux 4 and Aux 5 knobs to be used as hovering pitch and hovering throttle.

The Hover Analog parameter can be toggled back and forth between ACT and INH by pressing the Rolling Selector when ACT or INH is highlighted. If ACT is selected, the AUX 4 and AUX 5 knobs are programmed for hovering throttle and hovering pitch. If INH is selected, the right and left digital trimmers are programmed for hovering throttle and hovering pitch.

Switch Assignments

The 12X provides the ability to change the standard default switch assignments for the GEAR, AUX2 thru AUX7 channels and the high pitch trim. The switch positions are defaulted to the most common positions, however, changing the switch assignments (positions) is a matter of preference.

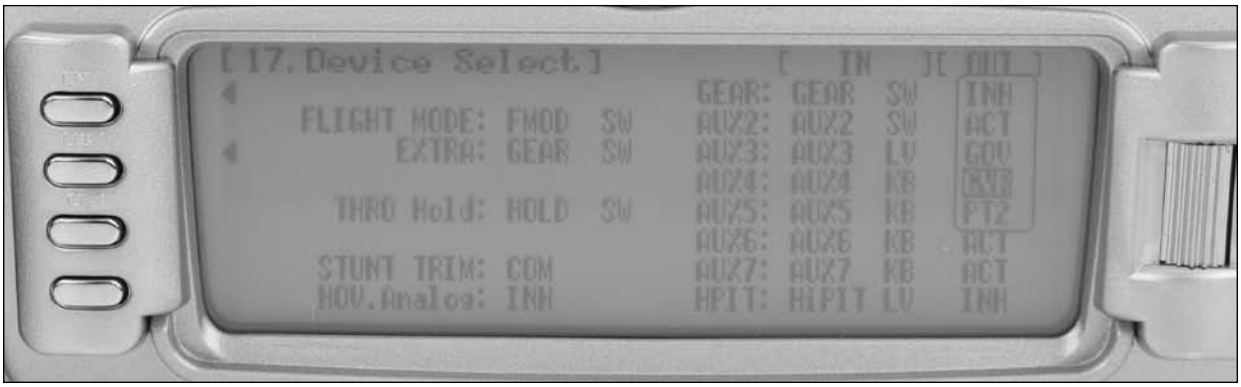
To Change One or More Switch Assignments

1. In the Device SEL function, use the Selector to highlight and select GEAR, AUX2 thru AUX7 channels.
2. Once a channel is selected, a list of available replacement switches is displayed. Highlight and select the desired switch with the Selector.
3. Repeat for as many switches as desired.

Assigning/Activating Governor, Gyro and Pitch 2 Functions

The 12X device select program provides the ability to activate and assign the Governor, Gyro and Pitch 2 functions to one of the following channels: GEAR, AUX2, AUX3.

> **Note**: The Governor and Pitch 2 functions are defaulted to Inhibit and are not available until the functions are activated in Device Select. Gyro is defaulted to the gear channel but can be inhibited or moved to channels Aux2 or Aux3 if desired.



If the Governor, Gyro or Pitch 2 Functions Are To Be Used

1. Highlight INH next to GEAR, AUX2 or AUX 3, pressing the Selector will access INH, ACT, GOV, GYR or PIT.
2. Use the roller to select the desired function.

Deactivating Channels

The 12X provides the ability to inhibit a number of channels. This is useful when auxiliary channels are used for mixing. In this instance, the switch will no longer operate the channels allowing them to be used as slave channels. Also the deactivated channels will assume a centered (1.50ms) position needed for mixing.

1. IF GEAR, AUX2 thru AUX7 are to be used as slave channels, then inhibit the corresponding switch by highlighting ACT along the bottom line of the display and pressing the Selector until INH appears under the switches that are to be turned off.

34: Swashplate Type

The Swashplate Type function enables the 12X to operate six different types of swashplate control systems.

The Swashplate options are:

- 1 Servo NORM standard mechanical mixing type
- 2 Servo/180°
- 3 Servo/120° CCPM (most popular)
- 3 Servo/140° CCPM (JR Vibe 90/50)
- 3 Servo/90° CCPM
- 4 Servo/90° CCPM

To Select a Swashplate Type

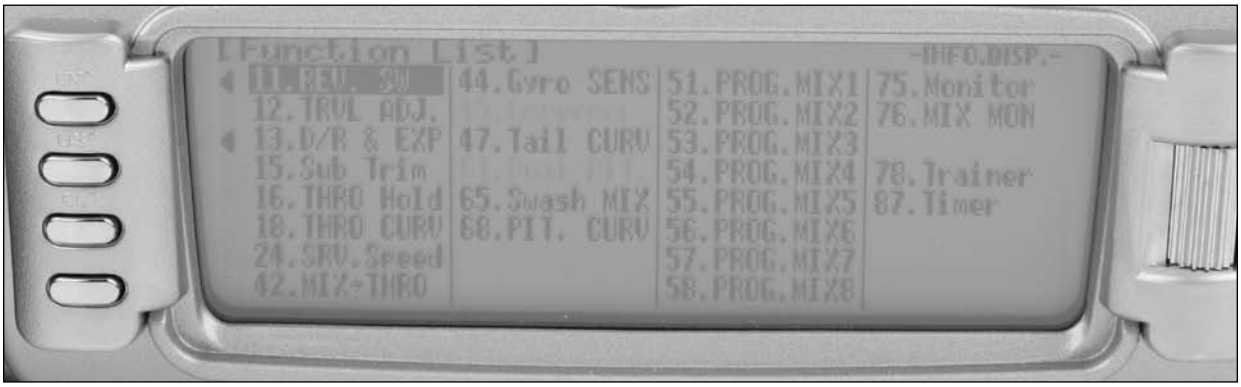
1. In the SYSTEM Menu, highlight and select Swash Type using the Roller.
2. Highlight and select the displayed swashplate to access the available swashplate types.
3. Select the desired swashplate.

Function Mode

The Function Mode contains programming that is used to complete the setup and then to adjust the helicopter's flight characteristics. Functions include Servo Reversing, Travel Adjust, Dual Rate and Expo, Sub Trim, Servo Speed, Pitch and Throttle Curves, Swashplate Mixes, Programmable Mixes, Gyro Programming, Governor Programming, Trainer and Timer Functions, etc. Many of these functions are frequently used to adjust the flight characteristics during setup and at the field.

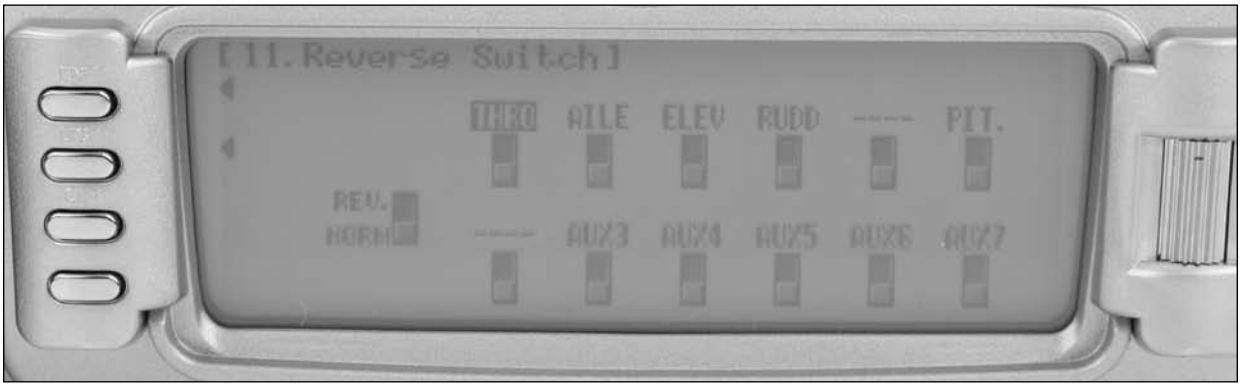
To Enter the Function Mode List

With the transmitter on, Press LIST and the Function list will appear.



11: Servo Reversing

The Servo Reverse screen allows the direction of each servo to be selected.



To Program Servo Reverse

1. Highlight and select REV.SW in the FUNC.LIST to obtain the servo reversing display.
2. Use the Selector to highlight and select those channels that need to be reversed. Pressing the Selector toggles the channel between Normal and Reverse.

12: Travel Adjust

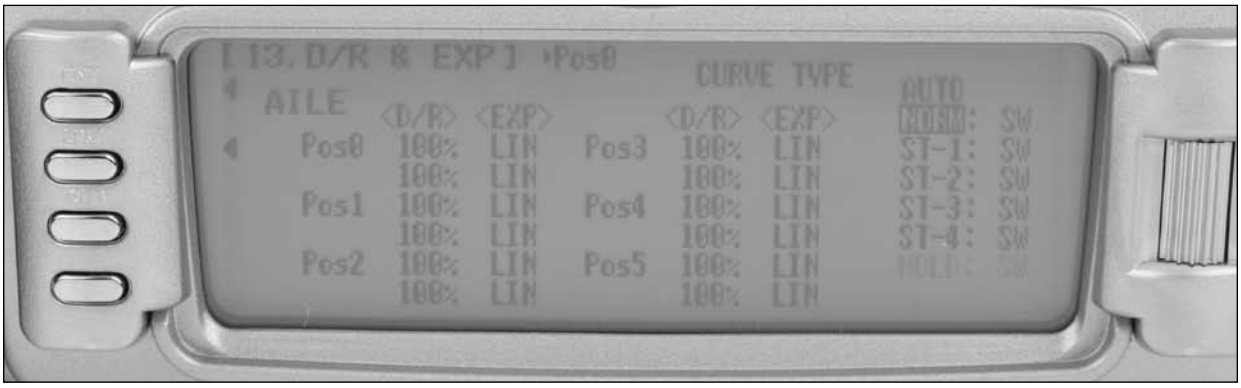
Travel Adjust allows the independent adjustment of servo travel for each direction of servo travel.

To Program Travel Adjust Values

1. Highlight and select TRVL ADJ. in the FUNC.LIST to obtain the Travel Adjust display.
2. Use the Selector to highlight and select each channel and adjust the travel in each direction by rotating the Selector. The direction of travel is changed by moving the stick/switch/lever in the desired direction to highlight L/R, U/D or +/-.

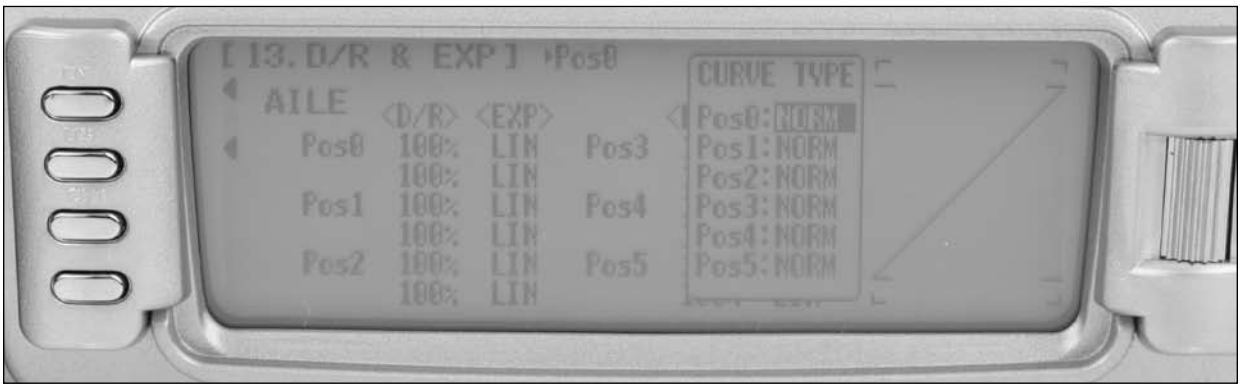
13: Dual Rate and Exponential

Up to six dual and exponential rates are available and are selectable via flight modes (up to 6) or dual rate switches (up to 3). In addition, various response curves including VTR (variable trace ratio), Linear/ Exponential and Exponential/ Linear curve types are available that allow the tailoring of the output curve. Dual and Expo rates are independently adjustable in each direction by moving the appropriate stick in the desired direction.



To Program Dual Rate and Exponential Functions

1. Highlight and select D/R & EXP in the FUNC.LIST to obtain the Dual Rate and Exponential display.
2. Highlight and select the displayed channel (upper left) and select Aileron, Elevator or Rudder.
3. Use the Roller to select and change the desired D/R and expo values for each position. Positions correspond to the dual rate switch positions or can be programmed to automatically operate in each flight mode (AUTO). Note that D/R and Expo values can be independently adjusted by holding the corresponding control stick in the desired direction while making adjustments.

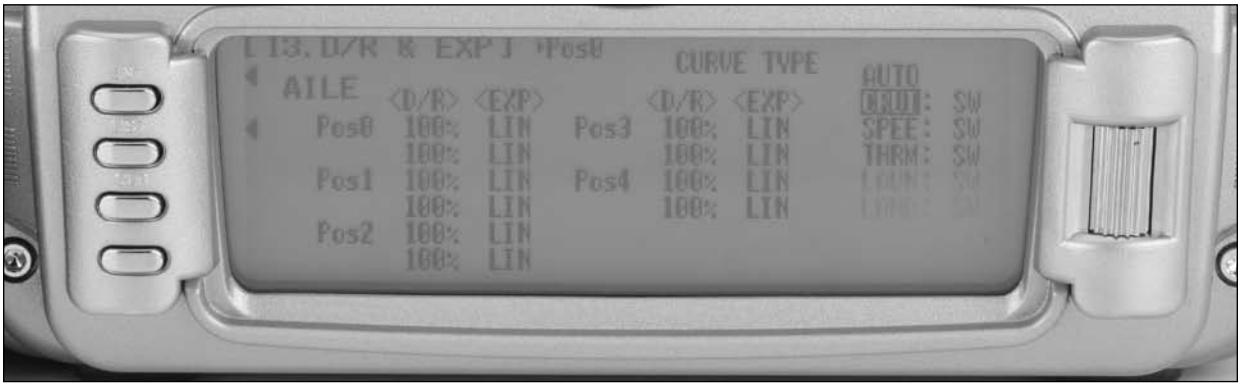


Note: VTR or Variable Trace Rate curves combine two slopes. The intersection point of the two slopes is determined by the VTR% selected (VTR60 gives an intersection point at 60%). The slope (rate of change) is adjusted with the D/R percentage.

4. To Select a Curve Type highlight CURVE TYPE. POS 1 thru 5 will appear on the screen. Using the roller select the position that you would like to change the curve type. Press the roller to select VTR50, VTR60, VTR70, VTR80, VRT90 LIN/E (Linear/Expo), EXP/L (Expo/Linear).

AUTO Function

5. The AUTO function automatically selects Dual Rate and Expo setting in each flight mode. If the AUTO function is desired highlight the desired switch under AUTO and select SW for dual rate switch or the desired D/R position to automatically activate that selection when the corresponding flight mode is selected. The active flight modes will be displayed. Select SW (D/R switch), or Pos1 through 5, and that position will be active when the corresponding flight mode is selected.



15: Sub Trim

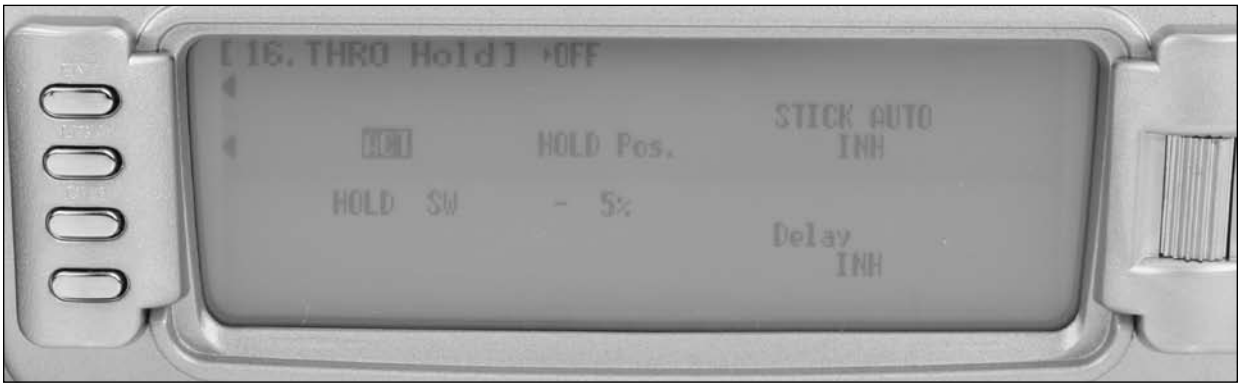
Use Sub Trims to fine-tune the output alignment of the servo arms.

To Program Sub Trim Values

1. Highlight and select Sub Trim in the FUNC.LIST to obtain the Sub Trim Display.
2. Highlight and select the channels where the sub trims must be adjusted. Once a channel is selected, rotate the Selector until the servo arm is in the desired position.

16: Throttle Hold

The Throttle Hold function is designed to hold the throttle output position in a specific position when the throttle hold switch is activated but still allow full pitch and cyclic control. Throttle Hold is normally used for autorotations or can be used as a throttle safety switch with electric models. The Throttle Hold switch is defaulted to the top right-rear corner of the transmitter, however, a different switch can be selected in the Device Sel section in the System Mode. In the forward position, Throttle Hold is on; in the rear position, Throttle Hold is off.



Accessing the Throttle Hold Function

1. Highlight and select THRO Hold in the FUNC.LIST to obtain the Throttle Hold Display.
2. Pressing the Selector will activate (ACT) or inhibit (INH) the Throttle Hold function.
3. Once the Throttle Hold function is activated, the screen will display the current Throttle Hold value.
4. Move the Selector to highlight HOLD Pos, then press. Roll the Selector to increase or decrease the Throttle Hold value to the desired position.

   Note: When the Throttle Hold is activated, and the switch is on, the "HLD" indication on the main screen will be displayed just under the model name.

Stick Auto

The Stick Auto function allows throttle hold to be activated automatically when the Throttle Hold switch is activated and the throttle is reduced below the programmed position. Although the Throttle Hold switch is active, when using this feature the throttle will continue to function until the throttle stick is moved below the desired cut position selected by you.

To Activate the Stick Auto Function

1. Highlight the Stick Auto function with the selector, and press to access. Next, roll the selector to increase/decrease the position of the cutoff point.

Hold Delay

The Hold Delay function allows the throttle servos movement to be slowed when switching from Throttle Hold back to a previous Flight Mode. This feature is helpful when practicing Autos. If the autorotation attempt is aborted, when the Throttle Hold switch is released, the throttle will increase slowly, eliminating the sudden burst of power and preventing damage to the gear train. The Hold Delay adjustable range is from 1/10 of a second, up to 2 seconds.

To Activate the Hold Delay

1. Highlight the Hold Delay function with the selector, and press to access. Next, roll the selector to the desired delay position, and press the selector to store. A good starting value is .75 (3/4) of a second.

18: Throttle Curves

The 12X offers up to five (5) separate throttle curves with up to eight adjustable points per curve. This function allows you to customize the throttle curve to maximize engine performance at any particular pitch setting. Once the throttle curves are established, each can be activated in flight using the 3-position flight mode switch. If the additional 2 flight modes (numbers 3 and 4) have been activated in the Device Select portion of the system mode, an additional switch will be used to activate these modes and two additional throttle curves will be available.

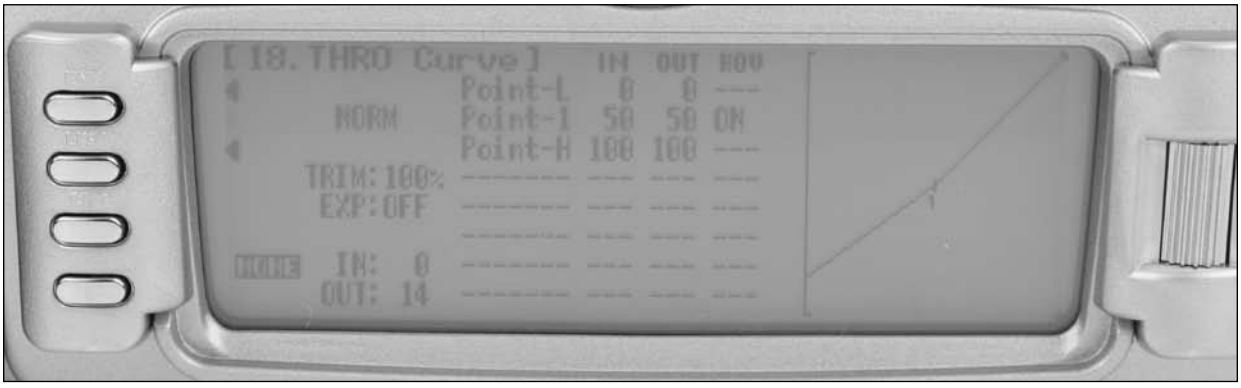
The flight mode switch offers three selectable positions:

- N=Normal
- 1=Stunt 1
- 2=Stunt 2
- Extra flight modes
- 3=Stunt 3 (optional)
- 4=Stunt 4 (optional)

Note: The N (Normal) position is used as the hover throttle curve.

Positions 1 and 2 (Stunt 1 and Stunt 2) are typically used for forward flight and 3D maneuvers. Optional flight modes 3 and 4 are also designed for use with aerobatic maneuvers and forward flight.

Note: The throttle trim and hovering throttle trimmer are only operable when the flight mode switch is in the normal position. In the 1, 2, 3, 4 or hold positions, these two functions have no effect. Also, adjusting the hovering throttle trimmer and throttle trim has no effect on the input values of the throttle curve. Each of the eight points of the throttle curve is independently adjustable from 0–100%.



Accessing the Throttle Curve Function

1. In function mode use the Rolling Selector to highlight the THRO CURV function, then press to access. ALL SERVOS HOLD ? will be displayed. Press YES or NO to access the throttle curve screen.
2. Moving the flight mode switch to the desired position will select the flight mode that will be programmed. The flight mode will be displayed in the upper left corner of the screen.
3. Move the Rolling Selector and highlight the desired throttle point to be adjusted. Press the Rolling Selector to access the point value, then roll the Rolling Selector to increase and decrease the point value.
4. To set throttle curves for flight modes switch the flight mode to the desired position and the screen will change to that flight mode.
5. Highlight the desired pitch point that you would like to adjust and press the roller. Rotate the roller to adjust that point on the pitch curve.
6. To add a point move throttle stick to the desired position until STR appears on the left bottom of the screen. Pressing STOR will store a new point at that position.

   Note: To eliminate a point, press ERAS (bottom left of the screen) when the point is highlighted.

7. To exit the Throttle Curve function, highlight the LIST with the Selector and press.

Exponential

The Exponential function blends the Curve between the points on the graph to provide a smooth response. The default value is OFF. To turn it on and smooth the mixing curve, highlight and select OFF and it will toggle to ON. An Expo function can be selected independently for each flight mode.

Trim (Mechanical Trim Lever)

In the Normal mode only, a throttle trim is available that allows the throttle trim value to be adjusted. The trim value adjusts the overall trim travel of the throttle only at low throttle in the normal mode. This trim value adjustment is helpful in adjusting the sensitivity of the throttle trimmer. To adjust the throttle trim authority, highlight TRIM and adjust the value using the roller. Note the onscreen graph can be used to indicate the trim value changes.

> **Note**: The throttle trim lever is only active when the flight mode switch is in the normal position. The throttle trim lever has no effect on flight modes 1, 2, 3, 4 or in throttle hold.

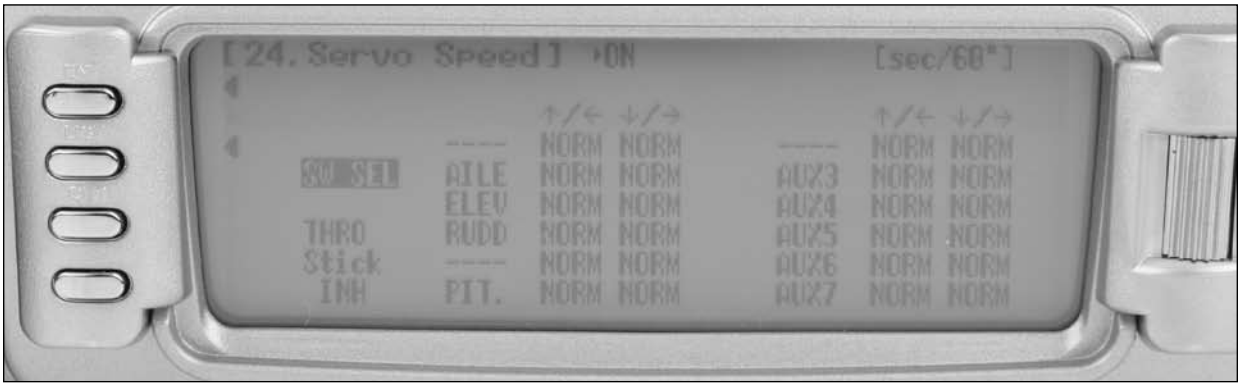
Hovering Throttle

Hovering Throttle increases or decreases the servo output via the trimmer or knob for the selected points set for the throttle curve. Use of the hovering throttle trimmer/ knob to shifts the curve upward or downward to advance or reduce rpm in hover. The HOV function can be activated at each point by selecting ON under HOV.

> **Note**: The Hovering Throttle has no effect on flight mode switch positions 1,2, 3,4 or Hold.

24: Servo Speed

The 12X provides the ability to adjust the speed of servos for each channel in each direction. The speed may be reduced (servo slowed) from its normal speed but it cannot cause a servo to move faster than its rated specifications. Each servo can have 2 sets of speeds in each direction that are Flight Mode or switch selectable.



To Adjust Servo Speed

1. Highlight and select SRV. Speed. Speed FUNC.LIST.
2. Select SW SEL and press the roller to access Switch Select. If only one servo speed is desired then all selectable switch positions in this screen should be P0. If two servo speeds are desired, then assign the desired switch that will change the servo speed to P1. Return to the main screen.
3. If a single set of servo speeds is desired, make sure the display is showing Pos0. If it is not, select Pos1 and change it to Pos0. Highlight and select the channel and direction for each servo that is to be adjusted. Once a direction for a servo is selected, the servo speed may be set so the servo travels from .193 seconds for 60 degrees of rotation to 16.4 seconds for 60 degrees of rotation. Adjust the speed of each servo until the desired speed is obtained.
4. If 2 sets of servo speeds are desired that are Flight Mode or switch selectable, one set of values is set to NORM for all channels, slowing of servos can be turned off by selecting the position (Pos0 or Pos1) that has the NORM values. Highlight and select Pos0 and change it to Pos1, and then highlight and select the channel and direction for each servo that is to be adjusted. Once a direction for a servo is selected, the servo speed may be set so the servo travels at the desired slower rate. Switch between Pos0 and Pos1 to view and adjust the 2 sets of values for each servo.

   Note: Pos1 always has priority over Pos0. In other words, if multiple switches are selected and one of the switches is in its Pos1 position, then all other switches are ignored and the Pos1 values are in effect.

42: Mix to Throttle

The 12X Cyclic-to-Throttle function is designed to add throttle to prevent main rotor rpm decay resulting from load changes placed upon the engine when an Aileron, Elevator or Rudder control is given.

The most common use for Cyclic-to-Throttle mixing is for Stunt Modes, allowing the main rotor rpm to remain consistent throughout aerobatic and 3D maneuvers. Normally, Cyclic-to-Throttle mixing is not used in Hover (Normal) mode since control inputs are generally small and much less aggressive.

> **Note**: If a Governor will be used for rpm control, it is not necessary to use the Cyclic-to-Throttle Mixing, and all values should be left at the factory default position (0%).

Programming the Cyclic-to-Throttle Function

1. In Function mode highlight the MIX-THRO function. Press the Rolling Selector to access the MIX-THRO screen.
2. Highlight the desired value to be adjusted with the Rolling Selector, and then press to open the options box. Roll the Rolling Selector to adjust the value as needed.

Selecting the Desired Flight Modes for Cyclic-to-Throttle Mixing

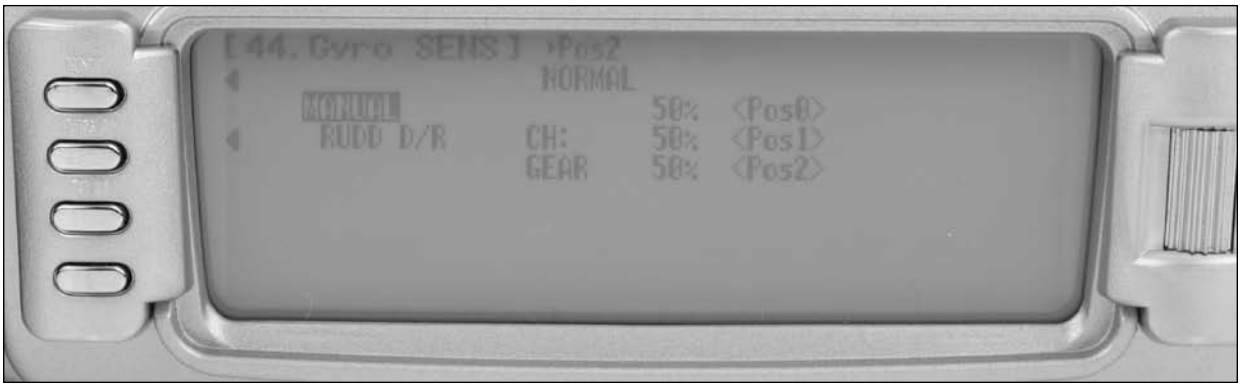
The 12X allows you to select the specific flight modes in which the Cyclic-to-Throttle mixing will be active. The factory default position is ON for all flight modes, which is not recommended in most cases. The Cyclic-to-Throttle mix is generally used for Stunt (flight) modes only, so it will be necessary to select the Cyclic-to-Throttle mixing for the desired flight modes.

1. Move the Rolling Selector to highlight the SW SEL for each of the Cyclic-to-Throttle mixes to be used.
2. Press the Rolling Selector to open the Flight Mode options box. Highlight the desired flight mode to be set (NRM, ST1, ST2, ST3, ST4, GEAR), then press the Rolling Selector to turn the mixing on or off for each of the active flight modes.
3. To exit the Cyclic-to-Throttle function, move the Rolling Selector to highlight LIST, and press.

44: Gyro Sensor

The 12X offers three different types of Gyro Gain Sensitivity Adjustments: manual, flight mode or automatic. This feature gives the user the choice of selecting gyro sensitivity through the rudder, aileron or elevator dual rate switches (manual), selecting one of three available gain settings for each flight mode (FOMD) or automatically selecting a gain for each flight mode (up to 6 gain settings). The gyro program can be set up for normal or tail lock gyros. In tail lock mode the value correlates with the actual percentage of the gyro output. A time lag feature delays the gain input when switching from tail lock to conventional mode preventing the tail from jumping when switching modes.

Note: To access the gyro function, the Gear, Aux1 or Aux 2 channels must be programmed to GYR in device select code 17 and the gyro gain lead must be plugged into this channel.



Accessing the Gyro Gain Function

1. Using the Rolling Selector highlight the GYRO SENS function in function mode to access the Gyro Sensor function.
2. To select the switch or function that will be used, select gyro gain settings. Highlight Manual then press the Rolling Selector to select the desired switch, auto or FMOD.
3. To select the gyro type, use the Rolling Selector to highlight NORM, then select T.LOCK if you have a tail lock or heading lock gyro NORMAL for a conventional gyro. Note: If T. LOCK is selected, a time lag function is available that will program a delay when switching from normal to tail lock mode preventing the tail from jerking when switching the tail lock to normal gain. The function can be toggled on or off.
4. Use the Rolling Selector to select the gain position to be adjusted, and then press and roll the Rolling Selector to increase or decrease the gain values as needed.
5. If AUTO mode has been selected, once the gain values for positions 0, 1 and 2 have been set, move the Rolling Selector to highlight the mode positions (NORM, ST-1, and ST-2), and select the gain position (value) for each mode.
6. To exit the Gyro Gain function, move the Rolling Selector to highlight LIST, and press.

45: Governor

The 12X Governor function is designed to be used with most currently available Governors. The Governor function allows rpm values to be set for each of the Active Flight modes, and will automatically change the Governor rpm values when the Flight Mode switch is moved to each of the active flight modes.

The value range in the Governor function is –125% to 125%. These values follow the Travel Adjust values. In other words, a desired Travel Adjust value of +55% would also be +55% in the Governor function.

The Governor programs operational channel can be assigned to the Gear, Aux1 or Aux2 channels in the Device Select screen.

Note: To access the Governor function, the Gear, Aux1 or Aux 2 channels must be programmed to GOV in device select code 17 and the governor lead must be plugged into this channel.

Accessing the Governor Function

1. Move the Selector and highlight the GOVERNOR function. Press the Selector to access.
2. Highlight the desired value to be adjusted with the Selector, and then press to access the value. Roll the Selector to adjust the value as needed.
3. To exit the Governor function, move the Selector to highlight LIST, and press.

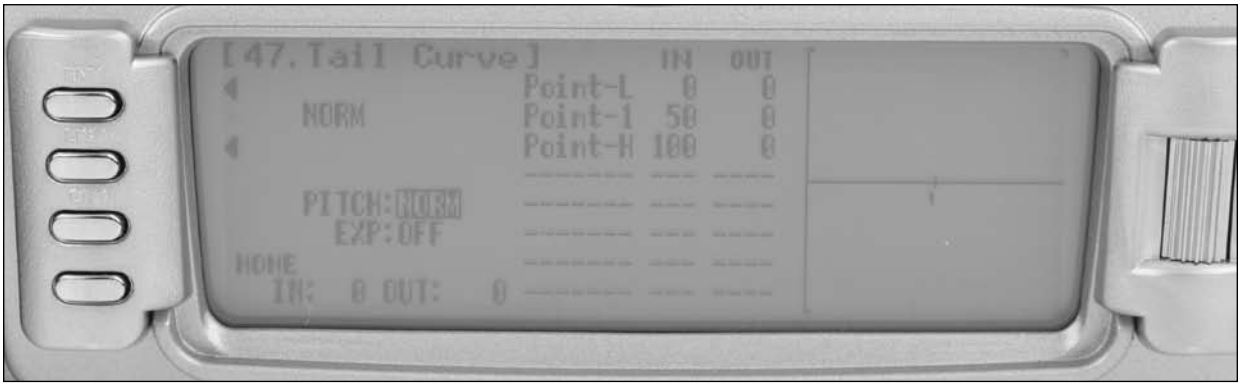
Note: Flight Modes ST-3 and ST-4 will only be shown if activated previously in System Mode.

47: Tail Curves- (Use Only with Non-Heading Hold Gyros)

The 12X offers up to five (5) separate tail curves with up to eight adjustable points per curve. This function allows you to optimize the tail curve to counteract torque at all pitch positions in every flight mode. Once the tail curves are established, each can be activated using the flight mode switch (s). If the additional 2 flight modes (numbers 3 and 4) have been activated in the Device Select portion of the system mode, an additional switch will be used to activate these modes and two additional tail curves will be available.

The flight mode switch offers three selectable positions:

- N=Normal
- 1=Stunt 1
- 2=Stunt 2
- Extra flight modes
- 3=Stunt 3 (optional)
- 4=Stunt 4 (optional)



Accessing the Tail Curve Function

1. In function mode use the Rolling Selector to highlight the Tail CURV function, then press to access. ALL SERVOS HOLD ? will be displayed. Press YES or NO to access the throttle curve screen.
2. Moving the flight mode switch to the desired position will select the flight mode that will be programmed. The flight mode will be displayed in the upper left corner of the screen.
3. Move the Rolling Selector and highlight the desired point to be adjusted. Press the Rolling Selector to access the point value, then roll the Rolling Selector to increase and decrease the point value.
4. To set tail curves for flight modes switch the flight mode to the desired position and the screen will change to that flight mode.
5. Highlight the desired point that you would like to adjust and press the roller. Rotate the roller to adjust that point on the tail curve.
6. To add a point move throttle stick to the desired position until STR appears on the left bottom of the screen. Pressing STOR will store a new point at that position.

   Note: To eliminate a point press ERAS (bottom left of the screen) when the point is highlighted.
7. To exit the Tail Curve function, highlight the LIST with the Selector, and press.

Exponential

The Exponential function blends the Curve between the points on the graph to provide a smooth response. The default value is OFF. To turn it on and smooth the tail curve, highlight and select OFF and it will toggle to ON. An Expo function can be selected independently for each flight mode.

61: Dual Pitch

The Dual Pitch function is designed for use with mechanical mix helicopters (non-CCPM) where two servos are used to control the pitch function. Note that this function is only available if the 1 servo NORM is selected in swashplate type and if the PIT function is assigned to the GEAR, AUX2 or AUX3 channels in device select. This function is primarily designed for large industrial use helicopters that require powerful pit control. The Dual Pitch function features a trace rate that allows the servo's output positions to be accurately matched at 7 points throughout the stroke.

Note: This function is only available if the 1 servo NORM is selected in swashplate type and if the PIT function is assigned to the GEAR, AUX2 or AUX3 channels in Device Select.

1. To access and activate the Dual Pitch function, highlight and select Dual PIT. in the FUNC.LIST to obtain the Dual Pitch display.
2. The display shows the channel that the pitch channel is mixed to and the points that can be adjusted to match the servo output of both servos.
3. To change the output of a specific point highlight the desired point using the selector and press the selector to access that value.
4. Rotate the roller to adjust the value of the selected point.

65: Swashplate Mix

The Swashplate Mix screen has several important functions. These functions include:

Aileron, Elevator and Pitch Authority

This function independently adjusts the maximum travel of the servos that work in unison for aileron, elevator and pitch control. If the aileron value is increased, the servos that control aileron only (the pitch and aileron servos) will increase travel when the ailerons are deflected and won't affect pitch or elevator travel. Conversely if the pitch value is increased all three servos (aileron, elevator and pitch) will increase travel when the pitch stick is moved, however, aileron or elevator inputs will not be affected by this travel increase. To reverse the direction of travel a – (negative) value can be selected. Adjustment range is from -125 to +125% (defaulted to +60).

Aileron to Elevator/ Elevator to Aileron Mix

This mix is used to correct for swashplate interactions (i.e. elevator input resulting in slight roll output). By mixing elevator to opposite aileron, this interaction can be corrected. Switches or flight modes can be selected (SE SEL) to turn this mix on/off. Generally this mix is turned on in stunt modes only.

3D Electronic Cyclic Ring

When active, the 3D electronic cyclic ring prevents the cyclic servos (aileron, elevator and pitch) from overdriving when a full elevator and aileron command is given. This is commonly used for 3D helicopters that are set up to give maximum swashplate travel for high cyclic rate maneuvers.

Exponential Function

An exponential function is available that compensates for CCPM servo horn non-linearity at the extremes of travel. It is recommended that this function always be turned on.

Elevator-to-Pitch Canceller

This function compensates for the different distance/ time traveled by the pitch, aileron and elevator servos with elevator inputs.

Note: The swashplate type must be selected in System Mode code 34 Swash TYP (see Page H-26).

Accessing the Swashplate Mixing Function

1. Using the Rolling Selector, highlight the Swash MIX function in function mode to access the Swashplate Mixing function.
2. To select the aileron, elevator or pitch authority, highlight the value next to the desired channel and press the roller to select the value. Rotate the roller to adjust the value.
3. To program an Aileron-to-Elevator or Elevator-to-Aileron mix, highlight the value below the desired mix AILE/ ELEV or ELEV/ AILE and press the roller to select the value. Note that right and left values are available. Rotate the roller to adjust the value.
4. To select a switch, turn on/off the aileron/elevator and elevator /aileron mix, then highlight SW SEL. A screen will appear that will allow several switches and flight modes to be selected to turn on/ off the mix function.
5. To activate the 3D cyclic ring, highlight INH next to E-RING and toggle the roller to ACT.
6. To activate the exponential function, highlight IOFF next to EXP and toggle the roller to ON.
7. To activate the Elevator-to-Pitch Canceller, highlight INH under ELEV-PIT. CANCELLER and toggle the roller to ACT.
8. To exit the Swashplate Mixing function, move the Rolling Selector to highlight LIST, and press.

68: Pitch Curves

The 12X offers up to five (5) separate pitch curves with up to eight adjustable points per curve. This function allows you to customize each pitch curve at any particular pitch setting. Once the pitch curves are established, each can be activated in flight using the 3-position flight mode switch. If the additional 2 flight modes (numbers 3 and 4) have been activated in the Device Select portion of the system mode, an additional switch will be used to activate these modes.

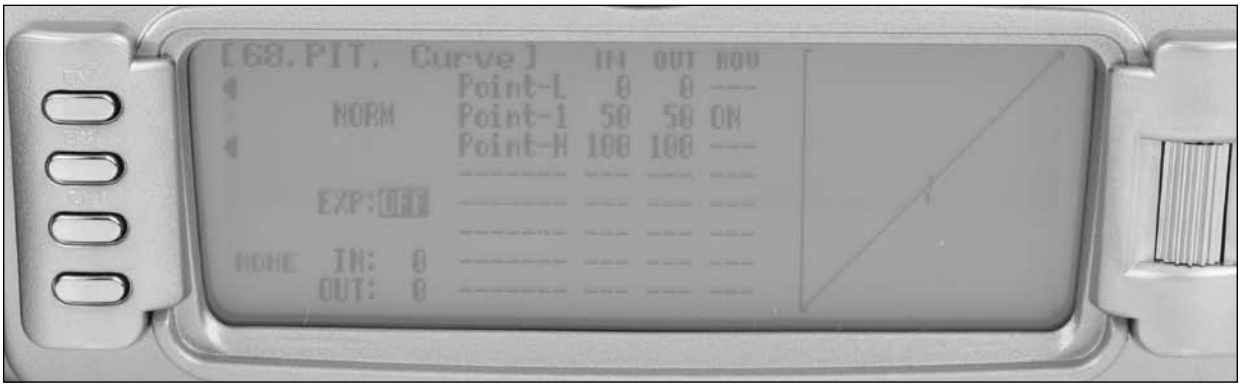
The flight mode switch offers three selectable positions:

- N=Normal
- 1=Stunt 1
- 2=Stunt 2
- 3=Stunt 3 (optional)
- 4=Stunt 4 (optional)

Note: The N (Normal) position is used as the hover pitch curve.

Positions 1 and 2 (Stunt 1 and Stunt 2) are typically used for forward flight and 3D maneuvers. Optional flight modes 3 and 4 are also designed for use with aerobatic maneuvers and forward flight.

Note: The hovering pitch trimmer is only operable when the flight mode switch is in the normal position. In the 1, 2, 3, 4 or hold positions, this function has no effect. Also, adjusting the hovering pitch trimmer has no effect on the input values of the pitch curve. Each of the eight points of the throttle curve are independently adjustable from 0–100%.



Accessing the Pitch Curve Function

8. In function mode use the Rolling Selector to highlight the PIT. CURV function, then press to access. ALL SERVOS HOLD ? will be displayed. Press YES or NO to access the Pitch curve screen.
9. Moving the flight mode switch to the desired position will select the flight mode that will be programmed. The flight mode will be displayed in the upper left corner of the screen.
10. Move the Rolling Selector and highlight the desired throttle point to be adjusted. Press the Rolling Selector to access the point value, then roll the Rolling Selector to increase and decrease the point value.
11. To set pitch curves for flight modes, switch the flight mode to the desired position and the screen will change to that flight mode.
12. Highlight the desired pitch point that you would like to adjust and press the roller. Rotate the roller to adjust that point on the pitch curve.
13. To add a point move throttle stick to the desired position until STR appears on the left bottom of the screen. Pressing STOR will store a new point at that position.

    Note: To eliminate a point press ERAS (bottom left of the screen) when the point is highlighted.

14. To exit the Pitch Curve function, highlight the LIST with the Selector, and press.

Exponential

The Exponential function blends the Curve between the points on the graph to provide a smooth response. The default value is OFF. To turn it on and smooth the pitch curve, highlight and select OFF and it will toggle to ON.

Hovering Pitch

Hovering Pitch increases or decreases the servo output via the trimmer or knob for the selected points set for the pitch curve. Use of the hovering pitch trimmer/ knob to shifts the curve upward or downward to advance or reduce Pitch in hover.

> **Note**: The Hovering Pitch has no effect on flight mode switch positions 1,2, 3,4 or Hold.

51 thru 58: Programmable Mixers

Programmable mixers are programmed to cause a second or slave channel to react as a result of providing input to the primary or master channel or to cause a channel to be controlled by moving a switch or lever. Programmable mixes are typically used to activate special aircraft functions like mixture control, pitch to aileron and elevator mixes to correct for flight dynamics, etc.

The 12X provides 3 Standard programmable mixes (PROG. MIX1 - PROG.MIX3) and 5 Multi-Point or Curve programmable mixes (PROG.MIX4 - PROG.MIX8). Multi-Point (or Curve) mixing provides the ability to program a customized curve that the slave channel will follow as it reacts to the master channel's input. Multi-Point mixes are different from normal mixes in that normal mixing results in a linear movement of the slave channel in relation to the master. With Multi-Point mixing there are up to 8 points that can be adjusted to control the position of the slave channel providing the ability to custom tailor the output of the slave channel.

The primary channel is called the master channel, while the channel that reacts to the master is called the slave channel.

Mixes are fully programmable, allowing any of the 12 channels to be master, slave or both (a channel can be mixed to itself). Trimmers and levers can also be used as a master and are extremely useful for programming proportional channels to be operated via a trimmer or lever. Additionally programmable mixes can always be on or turned off and on via a programmed switch, Stick position or flight mode. The Snap Roll/ Trainer switch (momentary switch SNPT) can also be programmed as the master channel.

Additionally there are 2 options for Master channels:

"#" (pound sign), these master channels are origin-type mixes. These include #THRO #AIL, #ELE and #RUD. Origin mixing bypasses any other mixing that might affect that channel such as throttle curves, exponential, travel adjust or other programming and uses the stick position only to control the mix.

"+" sign, these master channels are trim-include-type mixes. These include THR+, ELE+, AIL+ and RUD+. Trim-include mixes include the trim of the master channel as well as any other mixing to the master channel to control the slave channel of the mix.

Standard Programmable Mixer - (Std. Prog Mixer)

The 12X has 3 standard programmable mixers that allow for linear mixing of a master channel to a slave channel. The standard mixers are PROG.Mix1, Mix 2 and Mix 3.

These mixes provide for 2 sets of mixing values named Pos0 and Pos1. If one set of values is set to 0% then the mixer can be turned on and off with a stick, switch or lever. Each set of mixing values is comprised of 2 percentages to accommodate movement of the master channel in both directions. This is shown in the illustration below where there is an upper and lower percentage for both Pos0 and Pos1.

A mix can be made to always be on by setting Pos0 values only and not selecting any switches to switch between the Pos0 and Pos1 values.

Master Channel - (Std. Prog Mixer)

The master channel is the primary or controlling channel. The default for both the master and the slave channels is THRO. The master channel is selected by highlighting and selecting this parameter to obtain a list of channels and then selecting the Master channel from the list.

Note: There are 4 channels that appear more than once. They are Throttle, Aileron, Elevator and Rudder. Since these channels can be influenced by Dual Rate and Exponential settings, they are included in the list twice - once where the D/R and EXP settings are in effect and again where the D/R and EXP settings are ignored. The second time they are listed, there is a special designator to indicate that these channels can also be used as a master while bypassing any Dual Rate and Exponential settings that may be associated with them. They are designated by a "#" (pound sign) in front of the name - #THRO, #AILE, #ELE and #RUD. When one of these channels is selected as the master, all D/R, EXP and Curve settings associated with the master are ignored during the mixing operation. Instead, the mixer reads only the physical position of the stick to perform mixing.

A (+) behind the channel indicates a trim-include function. By selecting a channel with the (+), the trim lever affects both the master and slave channels.

Note: Some programmable mixes have + appearing after a specific channel and other mixes have a # before that specific channel. Choose the programmable mix that offers the type of mix (origin of trim include) that you desire.

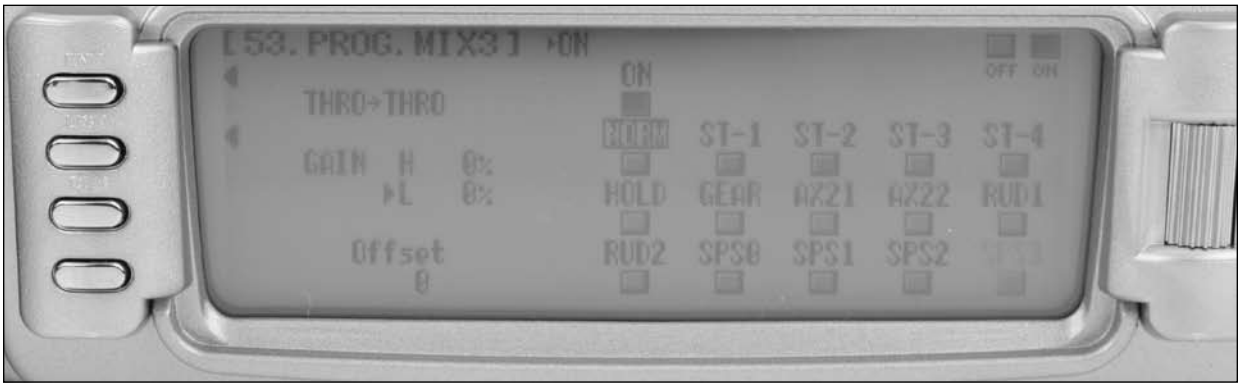
Slave Channel - (Std. Prog Mixer)

The slave channel is the secondary receiving channel and will move according to the program mix in relation to the master channel. The default for both the master and the slave channels is THRO.

The slave channel is selected by highlighting and selecting this parameter to obtain a list of channels and then selecting the slave channel from the list. The list contains each of the 12 channels in the system and CANCEL.

Switch Position

The right side of the Programmable mix screen displays the available switch options. If you choose to have a switch control the mix, either on/off or have two mix values, highlight and select the desired switch(s) and select position 0 or 1. Each standard programmable mixer has two positions - Pos0 and Pos1 and each position has 2 percentages (upper and lower) to accommodate mixing when the master is moved in both directions. Note that POS 1 has priority over POS 0.



Offset

Offset defines the position where the mixer changes directions. The Offset is defaulted to center position or 0 and this is most commonly used. With a 0 Offset, if the Rudder is the master, moving the rudder stick to the left of center causes a mix in one direction while moving the rudder stick to the right of center causes a mix in the other direction. Directions correspond to the upper and lower percentages for Pos0 and the upper and lower percentages of Pos1. The amount of mix and actual direction that the slave moves is determined by the Pos0/Pos1 values. The Offset applies to both Pos0 and Pos1 settings.

The offset may be changed by highlighting and selecting Offset and adjusting either a positive (+) or negative (-) value. A positive percentage moves the offset in one direction from center while a negative percentage moves the offset in the other direction from center.

Mix Values

Each standard programmable mixer can have two sets of mixing values - Pos0 and Pos1. Each set can have 2 percentages which control movement of the slave when the master is moved in each direction. A switch can be selected to switch between the Pos0 and Pos1 percentages.

The Pos0 settings determine how far, and in which direction, the slave channel moves when the master is moved above and below the Offset (the master moving in both directions) when the switch is in a position to select the Pos0 values.

To enter Pos0 values, highlight and select Pos0, move the master channel control (stick, lever or switch) in one direction and set the percentage and then move the master channel control in the other direction and set its value.

The Pos1 settings are identical to the Pos0 settings and determine how far, and in which direction, the slave channel moves when the master is moved above and below the offset (the master moving in both directions) when the switch is in a position to select the Pos1 values.

To enter Pos1 values, highlight and select Pos1, move the master channel control (stick, lever or switch) in one direction and set the percentage and then move the master channel control in the other direction and set its value.

CLR Button - (Std. Prog Mixer)

Note: Pressing the CLR button while a modifiable parameter is selected will reset the parameter to its default value. Pressing the CLR button when either the master or slave is highlighted inhibits the entire mixer and it is no longer functional.

To Inhibit a Mix

Highlight either the master or slave and press the CLR button to completely disable a mixer.

Multi-Point Programmable Mixer

There are 4 Multi-Point Programmable Mixers in the 12x, Prog. Mix4 thru Prog.Mix8. They differ from the standard mixes in that they allow non-linear mix response from the master to the slave. This is possible because the mixer uses up to 8 points to define the position of the slave channel relative to the master channel at up to eight selectable points. As the master reaches each point, the slave response position can be defined independent of other point settings.

Master Channel

The master channel is the primary channel, lever or trim lever. The master channel is selected by highlighting and selecting this parameter to obtain a list of channels and then selecting the master channel from the list.

There are 4 channels that appear more than once. They are Throttle, Aileron, Elevator and Rudder. Since these channels can be influenced by Dual Rate, Exponential and Throttle Curve settings, they are included in the list twice - once where the D/R and EXP settings are in effect and again where the D/R and EXP settings are ignored. The second time they are listed, there is a special designator to indicate that these channels can also be used as a master while bypassing any Dual Rate and Exponential settings that may be associated with them. They are designated by a "#" (pound sign) in front of the name - #FLP, #AIL, #ELE and #RUD. When one of these channels is selected as the master, all D/R, EXP and Curve settings associated with the master are ignored during the mixing operation. Instead, the mixer reads only the physical position of the stick to perform mixing.

A (+) behind the channel indicates a trim-include function. By selecting a channel with the (+) the trim lever affects both the master and slave channels.

Slave Channel

This is the slave channel that will move according to the program mix in relation to the master channel.

The slave channel is selected by highlighting and selecting this parameter to obtain a list of channels and then selecting the slave channel from the list. The list contains each of the 12 channels in the system.

Point Names/Numbers

The points that can be adjusted are listed vertically by name and are also displayed by number along the bottom of the graph.

Change the value of a point by highlighting and selecting the point name and dialing-in the desired percentage.

Current Point Setting

This list shows the setting for each of the 8 adjustable points (Point-L, 1, 2, 3, 4, 5, 6, 7, H). The value of each point determines where the point is positioned vertically on the graph, which dictates the slave servo position relative to the master. The point values can be set from -100 to +100. A value of 0 indicates the slave's center or neutral position. The overall travel of the slave channel is affected by the Travel settings described in the TRVL ADJ. function.

The value for a point can be changed by highlighting and selecting the Point Name to the left of the point value and then dialing-in the desired value.

Pressing the CLR button when a point value is highlighted resets the point to original settings.

Vertical Line

The vertical line on the graph shows the current master channel position. When the master channel is deflected fully in one direction, the line is to the extreme left over Point-L. When it is at neutral, it is in the center over Point-1 and when it is fully deflected in the other direction, the cursor is at the extreme right of the graph over Point-H. Where the vertical line intersects the Curve/Line over a given point defines slave servo position, which is equal to the value assigned to that point.

Multi-Point Programmable Mixer

Graph

The graph illustrates the mixing curve. The X-Axis (horizontal plane) represents master channel movement. The Y-Axis (vertical plane) represents the slave servo movement where the bottom 1/2 of the graph is one direction from neutral and the top portion of the graph is the other direction.

Points that Can Be Added and Adjusted

Curve mixes are defaulted to three points (L, 1 and H). Up to five additional point can be added. To add a point, move the master channel in the desired position until STOR appears on the left bottom of the screen. Pressing STOR will store a new point at that position.

Note: To eliminate a point press ERAS (bottom left of the screen) when the point is highlighted.

Exponential

The Exponential function blends the curve between the points on the graph to provide a smooth response. The default value is OFF. To turn it on and smooth the mixing curve, highlight and select OFF and it will toggle to ON.

Slave Channel Position

The slave servo position next to OUT at the bottom left of the display is expressed in values from -100 to +100, with 0 being neutral or center. It represents the servo travel that corresponds to the present master channel position.

Master Channel Position

The master channel position is shown on the bottom line of the display next to IN and is expressed in values from 0 to 100 with 50 being the center or neutral position. It represents the present master channel position.

Switch Select

There are numerous switches that can be used to switch between the Pos0 and Pos1.

> **Note**: If the upper and lower settings for Pos0 or Pos1 are left at 0%, the mixer can be turned on and off with the switch. In addition, if Flight Modes are activated in the Devic.SEL function, then flight mode switches may be selected. Also Switch positions can be used to selected between Pos0 and Pos1.

To select a switch that will switch between the Pos0 and Pos1 values, highlight and select the switch name and it will toggle between Pos0 and Pos1.

CLR Button

Pressing the CLR button while a modifiable parameter is selected will reset the parameter to its default value.

> **Note**: Pressing the CLR button when either the master or slave is highlighted inhibits the entire mix.

LIST Button

Press the LIST button to return to the FUNCTION List, or rotate the rotary selector until LST appears next to LIST and select it to return to the SYSTEM Menu.

ENT Button

Pressing the ENT button returns to the Main Display.

To Inhibit a Mixer (Turn it off entirely)

Highlight either the master or slave and press the CLR button to completely disable a mixer.

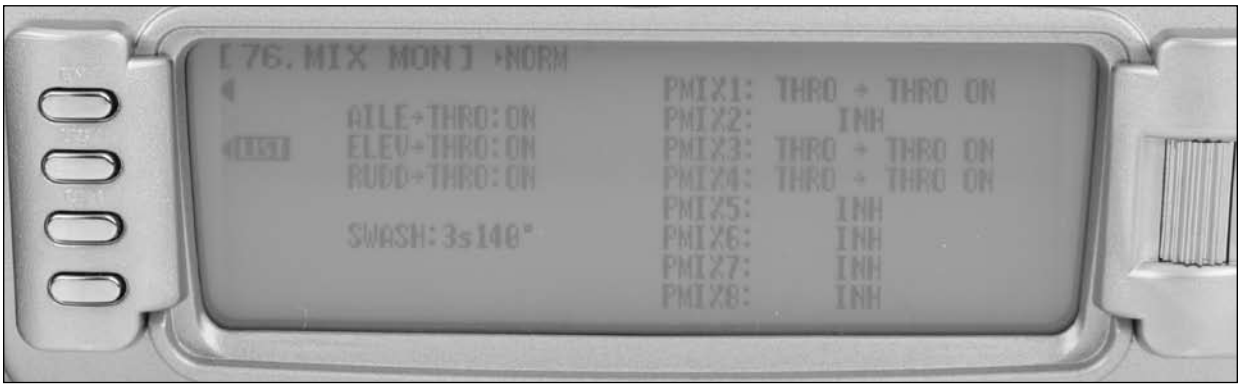
75: Monitor

The Monitor screen displays each channel and shows the movement of channels when sticks, levers and switches are moved. It renames channels according to special assignments to assist in identifying each channel. For instance, when Flaperon is the wing type, the Monitor will display RAIL for right Aileron and LAIL for left Aileron instead of displaying channel 2 and channel 6. The Monitor function also displays the current value of all digital trims.

1. To access the Monitor function, highlight and select MONITOR in the FUNC.LIST to obtain the Monitor display.
2. The default display shows the graphical positions of all channels. To view the digital trim positions for all trims, highlight and select PAGE. View both displays while moving sticks, switches and trim levers to see the movements of various channels and trims.

76: Mix Monitor

The Mix Monitor screen displays all the mixes, dual channels, wing type and snap roll functions. This screen is a convenient way to determine which functions are activated.



1. To access the Mix Monitor screen, highlight and select MIX MON in the FUNC.LIST to obtain the Mix Monitor display.

78: Trainer

The 12X features a programmable Trainer System that allows the instructor to transfer some or all of the primary flight control functions (Throttle, Aileron, Elevator and Rudder) to the student. It also allows for indicating if the transmitter is to be the master (controlled by the instructor) or slave (controlled by the student). The right or left trim lever is used to transfer control to the student when the 12X is being used as the master/instructor transmitter.

All Dual and Expo rates, Gear and flap positions are controlled by the master transmitter. Only the Throttle, Aileron, Elevator and Rudder channels are transferred to the slave transmitter.

Note: The Slave transmitter battery must be charged.

1. Connect the Trainer cord between the master and slave transmitters. Turn the power on to the master transmitter (the slave transmitter remains powered off and can even have the module removed).
2. If the slave radio is a 72MHz system, make sure the slave transmitter is in the PPM/FM modulation mode. If the slave system is a 2.4GHz DSM, this does not apply.
3. Highlight and select Trainer in the FUNC.LIST to obtain the Trainer Display.

12X Used as Master (Instructor)

1. If the 12X is being used as the master transmitter (the transmitter operated by the instructor), select the channel(s) that are to be operated by the slave transmitter (transmitter operated by the student) when the trainer switch is depressed.

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

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

The 12X is now ready to be used as the master or instructor transmitter. Depress the Left trim lever to transfer control to the student. Control will remain transferred until the Left trim lever is released.

12X Used as Slave (Student)

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

The 12X is now ready to be used as the slave or student transmitter.

87: Timer

The 12X features a sophisticated timer system with three timers. An integrated timer keeps track of total transmitter-on time for the current selected model and integrated time is displayed on the main display. Two other timers can be configured as countdown timers or as a stopwatch. These timers also appear on the main display when active and can be started and stopped via various switches. In addition an interval function can be programmed such that alarm will sound at preprogrammed intervals. A down alarm can be programmed that will sound an alarm prior and up to the programmed count down time and a one time function sounds the alarm once or continuously when the time is reached.

1. To configure the timers, highlight and select Timer in the FUNCTION LIST to obtain the Timer display.
2. Highlight and select INH under TIMER1 or TIMER2 and then select DOWN-T of STOP W. Use the Selector to set the countdown set time, interval, down alarm and one time functions.. Once the timer is set, TIM will appear on the main display in the lower left corner. The timers can be programmed to several different buttons or switches. Use the Selector to highlight the desired button or switch to operate the timer. Press the Selector to confirm the selection. The desired set time, beep interval, down alarm can be set as desired. When the One Time function is ON, the timer will start with the switch selected, but pressing the switch again will have no effect. If the One Time function is OFF, the timer can be stopped and restarted as many times as desired with the switch selected.
3. To reset the integrated timer, highlight and select the time under INTEG-T and Push [CLR]=0:00 appears on the display. Press the CLR button to the left of the display to reset the integrated timer.

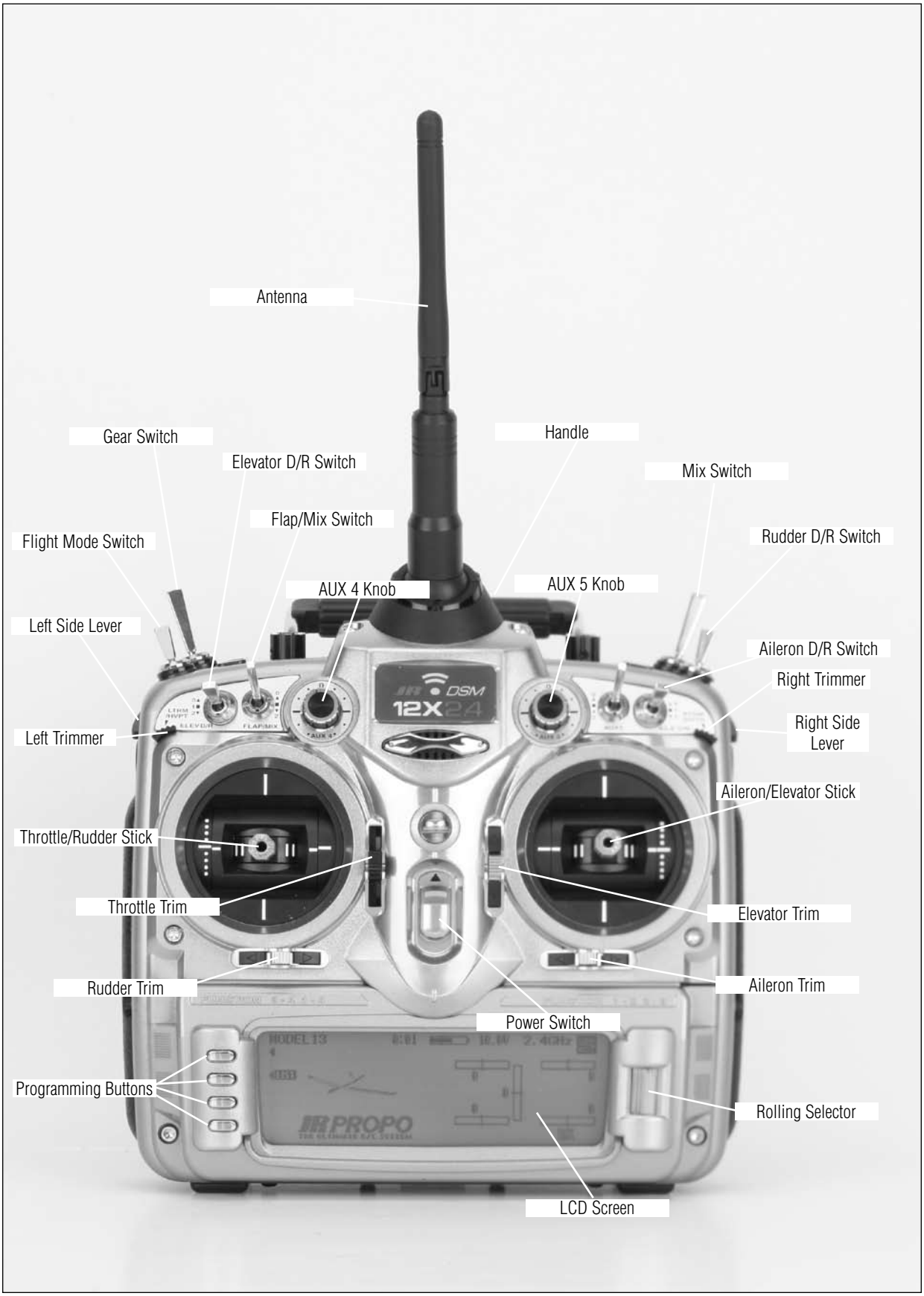
   Note: To reset the stop watch or countdown timer, highlight the timer function using the roller on the screen and press CLR.

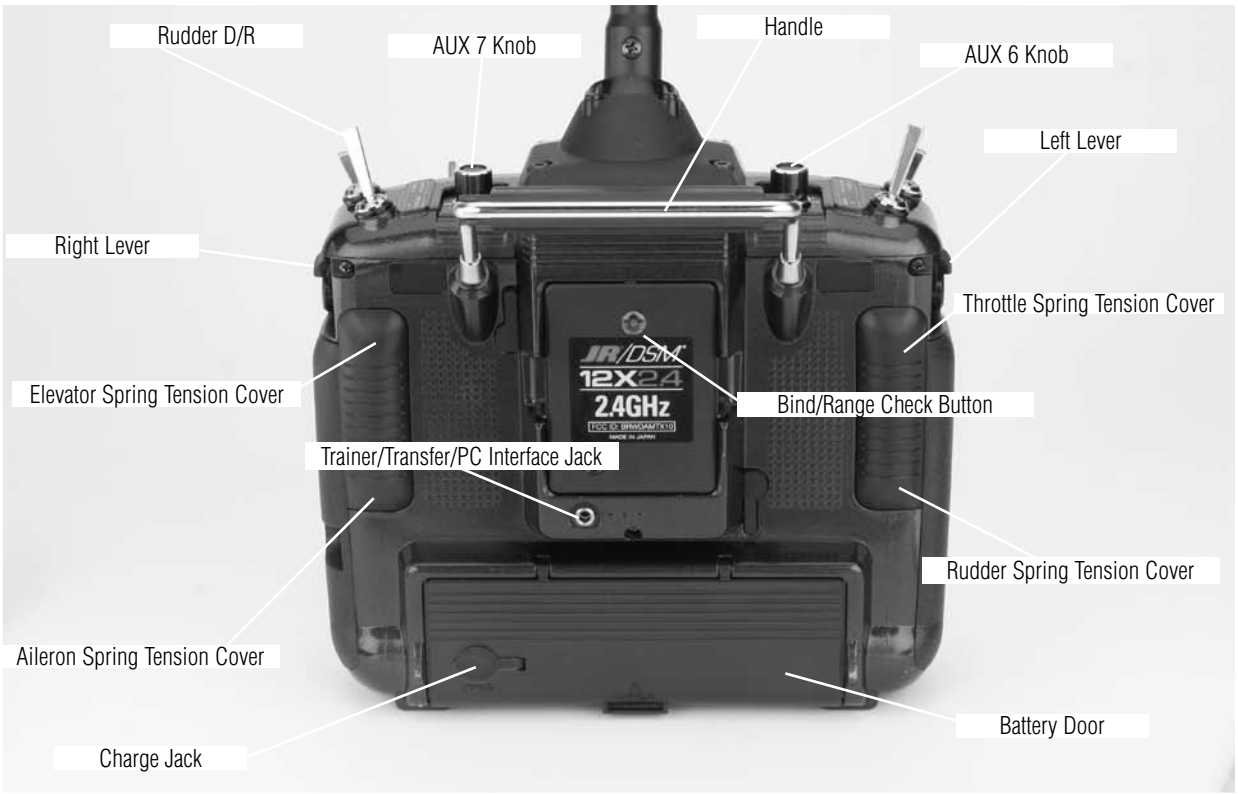
12X Sailplane Mode

Introduction

The 12X GLID programming is optimized for multi-function sailplanes. The software was developed by some of the world's leading sailplane pilots, offering the highest level of versatility and sophistication. The system features up to 5 programmable flight modes that allow specific configurations to be selected in each flight mode. Following is a list of features:

- Switch Assignability for channels and functions (the use of caps in this section seems inconsistent to me – but I'm not sure how to correct it, other than the things I have marked)
- 50-model memory
- Up to 5 fully programmable Flight Modes
- Flight Mode Naming allows custom naming of each flight mode
- Dual control functions for elevator, rudder, flap and spoilers
- Tip aileron programming
- V-tail mixing
- Stick Position switches allow mixing functions to be turned on/off via a stick position
- Fully programmable motor function
- Camber programming for each flight mode
- Warning system allows custom programming of alarms for various switch and stick positions
- Programmable servo speed
- Triple Rates/Exponentials (up to 5 Rates/EXPOs for Aileron, Elevator and Rudder in flight modes)
- Adjustable Trim Rates (10–100 Trim Steps)
- 8 Programmable Mixes (includes 5 Multi-Point and 3 Standard mixes)
- Programmable Trainer system (selectable channels for student control)
- 3 Programmable Timers that can be triggered with the throttle position or programmable switches
- Servo Monitor (automatically renames channels according to assignments)
- Mix Monitor displays all active mixes


Antenna
Gear Switch
Elevator D/R Switch
Handle
Mix Switch
Flap/Mix Switch
Flight Mode Switch
Rudder D/R Switch
AUX 4 Knob
AUX 5 Knob
Left Side Lever
Aileron D/R Switch
Right Trimmer
Left Trimmer
Right Side Lever
Aileron/Elevator Stick
Throttle/Rudder Stick
Throttle Trim
Elevator Trim
Rudder Trim
Aileron Trim
Power Switch
Programming Buttons
Rolling Selector
LCD Screen


Rudder D/R
AUX 7 Knob
Handle
AUX 6 Knob
Left Lever
Right Lever
Throttle Spring Tension Cover
Elevator Spring Tension Cover
Bind/Range Check Button
Trainer/Transfer/PC Interface Jack
Rudder Spring Tension Cover
Aileron Spring Tension Cover
Battery Door
Charge Jack
JR/DSM
12X24
2.4GHz

Programming a Sailplane

The following section contains in-depth details regarding each of the available programming functions. If you're just getting started, you'll likely find it easier (and we recommend) using the programming guide for sailplanes on page S-69. This step-by-step guide leads you through a typical 6-servo sailplane giving the key strokes necessary to set up a sailplane, including flight modes, crow and side lever camber adjustments. We recommend referring to the section below when a more in-depth understanding of a specific programming feature is desired.

System Mode

System mode contains the foundational programming that is normally only used when first setting up a Sailplane. System mode functions include: model select, model name, model reset, Wing type etc.—functions that are typically set once during setup and then are seldom changed or adjusted. Below and throughout this section, the functions are in the order that they appear in the System Mode List.

To Enter System Mode

Press ENT and hold while turning on the transmitter.

The screen should appear as follows.

SYSTEM MODE LIST

System mode contains the follow screens:

84: Model SEL	Model Select	Page S-5
81: MDL Name	Model Name	Page S-7
28: MDL Reset	Model Reset	Page S-8
89: Type SEL	Type Select	Page S-8
85: MODULAT.	Modulation (12X MV System Only)	Page S-9
93: Freq SEL.	Frequency Select (12X MV System Only)	Page S-9
83: Trim SYS.	Trim System	Page S-11
91: STK Pos SW	Stick Position Switch	Page S-13
92: FM Name	Flight Mode Name	Page S-14
86: Transfer	Model Transfer	Page S-15
97: Warning	Warning	Page S-17
98: Settings	Settings	Page S-18
17: Device SEL	Device Select	Page S-18
22: Wing TYP	Swashplate Type	Page S-22

Function Mode

Function Mode contains programming functions that are used to complete the setup and then used to adjust the parameters in each flight mode. Below and throughout this section the functions are in the order that they appear in the Function List.

To Enter Function Mode

Press the LIST button after the transmitter is powered-up to obtain the FUNCTION LIST.

FUNCTION MODE LIST

Function Mode contains the follow screens:

11: REV. SW	Reverse Switch	Page S-23
12: TRVL ADJ.	Travel Adjust	Page S-23
13: D/R & EXP	Dual Rate and Exponential	Page S-24
15: Sub Trim	Sub Trim	Page S-25
16: MOTO Hold	Throttle Hold	Page S-25
21: Flaprn MX	Flaperon Mix	Page S-26
24: SRV. Speed	Servo Speed	Page S-27
25: CAMB SYS.	Camber System	Page S-28
32: DIFFEREN.	Differential	Page S-29
33: Balance	Balance	Page S-30
44: Gyro SENS	Gyro Sensor	Page S-31
46: RUDD- SPOI	Rudder-to-Spoiler Mix	Page S-31
62: AILE-RUDD	Aileron-to-Rudder Mix	Page S-32
63: ELEV-FLAP	Elevator-to-Flap Mix	Page S-33
69: Flap Rate	Flap Rate	Page S-35
71: Brake SYS	Brake System	Page S-34
51: PROG. MIX1	Program Mix 1	Page S-35
52: PROG. MIX2	Program Mix 2	Page S-35
53: PROG. MIX3	Program Mix 3	Page S-35
54: PROG. MIX4	Program Mix 4	Page S-35
55: PROG. MIX5	Program Mix 5	Page S-35
56: PROG. MIX6	Program Mix 6	Page S-35
57: PROG. MIX7	Program Mix 7	Page S-35
58: PROG. MIX8	Program Mix 8	Page S-35
75: Monitor	Monitor	Page S-43
76: MIX MON	Mix Monitor	Page S-43
77: Failsafe	Failsafe (12X MV System Only)	Page S-43.5
78: Trainer	Trainer	Page S-44
87: Timer	Timer	Page S-45

System Mode

Programming a new model generally begins by accessing the SYSTEM Mode List. System Mode is where models are selected, the model type is chosen (airplane, helicopter or sailplane) and other high-level information is programmed. It is also used to activate some of the more advanced programming features such as Flight Modes, Switch Assignments, and Wing Types.

Accessing the System Menu

1. The System menu [System Mode List] is obtained by holding down the ENT button while turning the transmitter on.

84: Model Select- (Copy Function)

Model Select allows the programming parameters for up to 50 different models to be stored and selected in up to 50 individual model memories. This screen also allows a model to be copied from the current selected model to any of the other 49 available internal model memories (Model Copy).

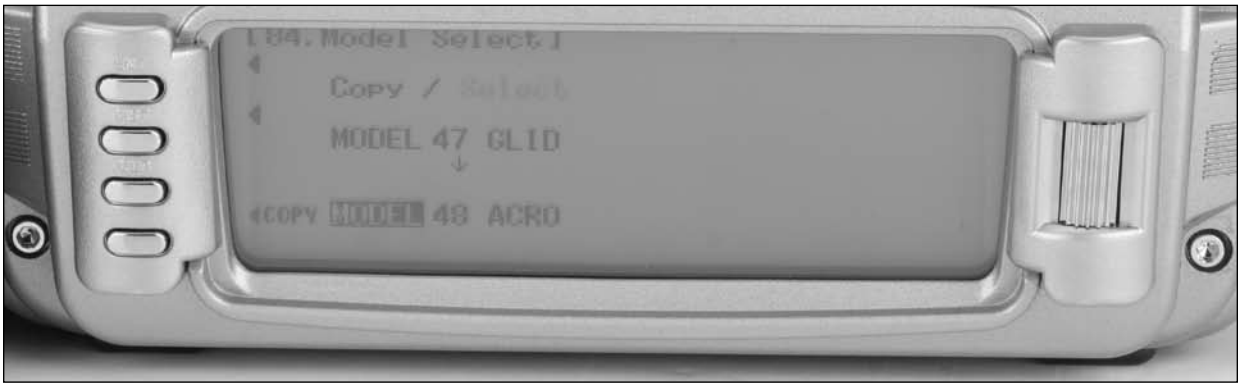
Note: When setting up a new model it is recommended that an unused model memory is selected. If a current model memory is selected, it's recommended that the model be reset to factory default settings before programming the new model. See Model Reset page S-8.

To Select a Model Memory

1. In the SYSTEM MODE, highlight and select Model SEL using the rolling Selector.
2. Use the rolling Selector to highlight MODEL and select the desired model number to be used using the rolling selector.
3. Return to the SYSTEM Menu by pressing the LIST button.

Model Copy

Making a backup copy of the model memory protects against losing the original program and also allows one to experiment with the original program, knowing that the original settings can be restored by copying the backup copy back to the original model memory.



To Copy a Model to Another Internal Memory

1. In the SYSTEM Menu, highlight and select Model SEL using the rolling Selector.
2. Use the rolling Selector to highlight Select then press the roller to access Model Select.
3. Rotate the roller to select the desired model memory that you wish to copy the current program to (1-50).
4. Press the roller to select the highlighted model that you wish to copy to.
5. Press the COPY button to copy the current model list above to the selected model listed below.
6. Return to the SYSTEM Menu by pressing the LIST button.

Note: The model memory that is copied to will be replaced with the current model memory programming. It is recommended that a model memory that is not being used be selected to “copy to” as the information in that memory will be erased and replaced with the current model memory during copying.

81: Model Name

The Model Name screen allows each model to be given up to a sixteen-digit name or number. This is convenient for identifying a model. The model's name will appear on the main info screen.

To Name a Model

1. In the SYSTEM Menu, highlight and select MDL Name using the Selector.
2. The cursor (indicates where the next character will be placed) is positioned at the beginning of the model name. Press the Selector to obtain a list of available characters.
3. Highlight and select the desired character to form the model name. After the character is selected, rotate the Selector to position the cursor where the next character is to be placed and press the Selector to obtain the character list again. Repeat until the model name is completed.
4. Return to the SYSTEM Menu by pressing the LIST button.

28: Model Reset

Model Reset is used to reset all programming to factory default settings. When setting up a new model, it is important to reset all parameters to their default or factory settings before proceeding with any other programming. This is to ensure that there are no programming values or functions active from a previous model or programming session.

To Reset a Model Memory

1. In the SYSTEM MODE, highlight and select MDL Reset using the Selector.
2. Press the CLR button that is next to RES on the display.
3. Press the lowermost button next to YES on the display to reset all data for this model.
4. Return to the SYSTEM Menu by pressing the LIST button.

89: Type Select

Type select allows the model type to be selected. Model types include HELI (helicopter), ACRO (airplane) and GLID (glider).

Note: When changing model types the programming information will be reset to the factory default setting, losing the previous settings.

To Select a Model Type

1. In the SYSTEM MODE, highlight and select Type SEL using the Selector.
2. Highlight and select ACRO using the Selector and press the selector to access the ACRO mode.
3. Return to the SYSTEM Menu by pressing the LIST button.

85: Modulation - (12X MV System only)

Note: This function is only available on the 12X MV version and only when the TSM-72A 72MHz module is plugged in.

Important: When the 72MHz module is plugged in and the system is turned on, the antenna must be attached. Operating the 72MHz module without the antenna attached could overload the internal transistor causing a failure.

Warning: Only the JR TSM-72A and JRM2.4 modules are compatible with the 12X MV. Do not install a standard-type JR, Spektrum or other branded module in the 12X as damage will occur.

The 12X MV version radio system allows the RF module to be replaced allowing the system to operate on 72MHz or 2.4GHz. Note that the transmitter automatically detects which module is installed and modifies the accessible programming appropriate to the module selected.

The Modulation screen (code 85) allows the selection of modulation for 72MHz receiver types. Modulation types available are:

APCM - JR's newest version PCM

SPCM - Most current available JR PCM receivers use this type of modulation

ZPCM - Compatible with older JR receivers

PPM - FM modulation

Note: It's important to select the modulation to match the receiver type. JR receivers have the modulation type printed on the receiver.

To Program a Modulation Type

1. In the SYSTEM Menu, highlight and select Type MODULAT. using the Selector.
2. Highlight and select the currently selected modulation type (APCM) using the Selector and press the selector to access all available modulation types (APCM, SPCM, ZPCM, PPM).
3. Rotate the roller to highlight the desired modulation type then press the roller to select the modulation type.
4. Return to the SYSTEM Menu by pressing the LIST button.

93: Frequency Select- (12X MV system only)

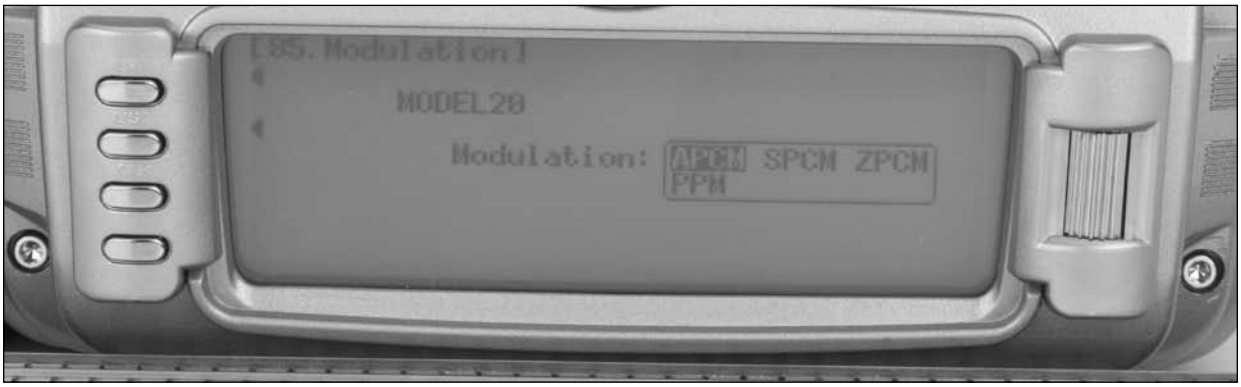
Note: This function is only available on the 12X MV version and only when the TSM-72A 72MHz module is plugged in.

Important: When the 72MHz module is plugged in and the system is turned on, the antenna must be attached. Operating the 72MHz module without the antenna attached could overload the internal transistor causing a failure.

Warning: Only the JR TSM-72A and JRM2.4 modules are compatible with the 12X MV. Do not install a standard type JR, Spektrum or other branded module in the 12X as damage will occur.

The 12X MV version radio system allows the RF module to be replaced allowing the system to operate on 72MHz or 2.4GHz. Note that the transmitter automatically detects which module is installed and modifies the accessible programming appropriate to the module selected.

The Frequency Select function allows the selection of 72MHz channels 11 thru 60 when the 72MHz module is installed. This screen displays the channel and corresponding frequency.



To Select a Frequency

1. In the SYSTEM Menu, highlight and select Type FREQ SEL. using the Selector.
2. Highlight and select the currently selected channel using the Selector and press the selector to access all available channels.
3. Rotate the roller to select the desired channel then press the roller to select that channel. The selected channel will be displayed on the main screen every time the transmitter is turned on and RF-ON or RF-OFF will be displayed on the left side of the screen. To transmit press RF-ON.

83: Trim System

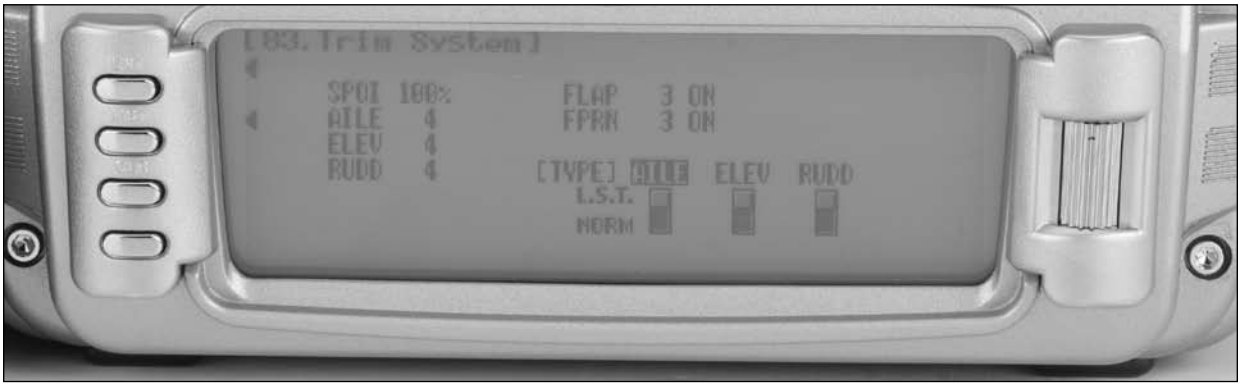
The Trim System function adjusts the sensitivity of the spoiler, aileron, elevator and rudder trims, plus the Flap trim and Flaperon trim levers. The aileron, elevator and rudder trims are adjustable from 0–10, with 10 being the coarsest adjustment and 0 being trim off. The Flap and Flaperon trims are adjustable from 0 to 30 in 3-step increments. Adjusting the digital trim values has no effect on the total trim travel (unless 0 is selected), however, it affects the resolution of each trim input. When the value is set to 10, each click of trim adjusts the servo output by 10µs and there are only 10 trim increments from center to each end. When set to 5, the output is changed 5us per trim step and there are 20 trim increments from center to each end. When set to 1, each click of trim changes the servo output by 1µs and there are 100 trim increments. When set to 0 the trim levers cease to function effectively, turning off the trim function. The right and left trim levers are adjustable from 0 to 200 and can be turned on/ off. When adjusted to above 100% the trimmer functions as a three-position switch. Reducing the value increases the number of output positions.

When adjusting the digital trims (AILE, ELEV, RUDD), the total trim travel does not change – only the number of increments (beeps) changes, which makes for finer or coarser trim movements. When adjusting the analog spoiler trim, however, the total trim travel is actually reduced when set to less than 100%.

It is recommended to use a fairly coarse setting, such as the factory default 4, when test flying a model for the first flights in order to be able to trim it quickly, and then use a finer setting, such as 3–1, for final precision trimming.

LST Trim

The LST trim feature has two options, LST and normal. In normal, when making trim changes using the Aileron elevator or rudder digital trims, the center as well as each end point is affected by the trim value (i.e. right trim causes the center, the right end point and the left end point to all shift to the right). When LST is activated, only the center position is trimmed. (i.e. the center is shifted to the right but the end points are not affected). This is useful for control surfaces that have a hard stop end point to prevent over-travel caused by trim or if it's desired to have trim changes not affect the total roll pitch or yaw rate. LST trim is normally turned off for sailplanes.



To Adjust the Trim Rates

1. Highlight and select TRIM SYS. in the SYSTEM menu to acquire the Trim System function.
2. Highlight and select the trim that is to be changed and use the Selector to set a value of 1–10 (1 = finest, 10 = coarsest. Note the Flap and Flaperon trims can be turned off or on by selecting On or Off).
3. Repeat for other trims as desired.

To Select the LST Trim Function

1. Highlight and select the desired channel (AILE, ELEV or RUDD) next to (TYPE) LST and press the roller to select LST or NORM.
3. Repeat for other channels as desired.

91: Stick Position Switch

The Stick Position Switch function allows the throttle, aileron elevator or rudder stick positions to be preprogrammed to turn on/ off mixes or the timer. Four stick position programs are available and one or more can be assigned to various mixes or functions. The stick position that turns the Stick Position switch off /on is selectable as well as the direction to turn on/ off. Also a symmetrical option is available that allow the function to be turned or with a preprogrammed equal right or left (up or down) stick position.

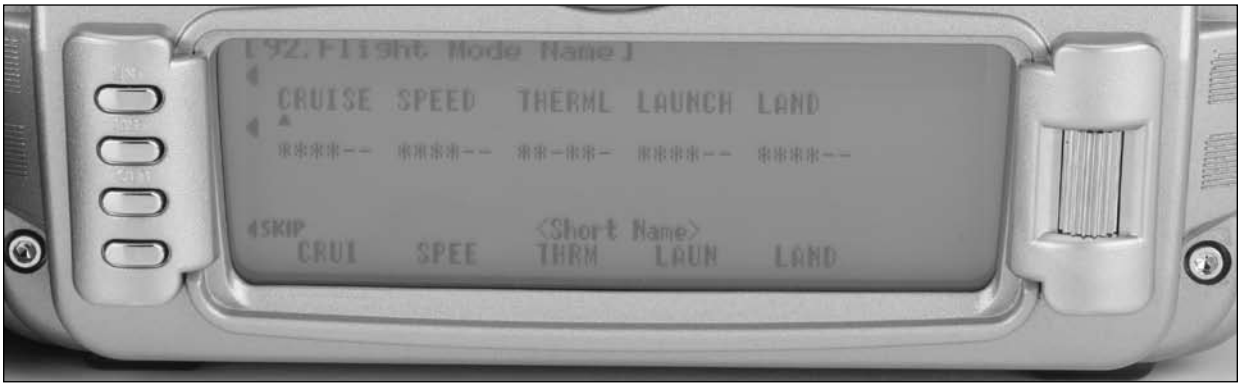
To Program a Stick Position Switch

1. In the SYSTEM Menu, highlight and select STK PosSW using the Selector.
2. Highlight the desired Stick position switch that you desire to use (SPS0, SPS1, SPS2, or SPS3) and press the roller. All four are the same.
3. Select the desired channel that will be used to trigger the Stick position (Throttle, Aileron, Elevator and Rudder).
4. Rotate the roller to select POS and adjust to the desired value that you wish to have the mix function turn off/ on. 0 = center, L100= Left full stick travel, etc. Note ON/ OFF is displayed at the top of the screen and when moving the stick this will indicate that the function is working.
5. Use the roller to select ON and select Low/ High or Right / Left to access the desired direction that the function will turn on/ off.
6. A symmetrical function is available that allow the stick position to be turned on/ off as the stick is displaced symmetrical in either direction. It's necessary to first program a value in the POS then highlight the SYM and activate it using the roller. The center can now be programmed to turn on or off by selecting the ON and highlighting Low/ High or Right /Left.

   Note: The above procedure establishes the base for turning on/ off mixes, change throttle curves, change differential rates, etc. To program the stick position, it's necessary to go to the desired function in Function mode and select SPS0, SPS1, SPS2 or SPS3 under SW (switch) in that specific function.
7. Return to the SYSTEM Menu by pressing the LIST button.

92: Flight Mode Name

The Flight Mode Name program allows each flight mode to be custom named with up to six characters. On the main screen an abbreviated (short name of up to four characters) will be automatically displayed when that flight mode is selected. Pre-programmed names for flight modes include Cruise, Speed, Thermal, Launch and Land, but these can be changed to any preference.



To Program a Flight Mode Name

1. In the SYSTEM Menu, highlight and select FM Name using the Selector.
2. Highlight the desired flight mode character position using the roller then press the roller to access the list of the available characters.
3. Highlight and select the desired character to form the flight mode name. After the character is selected, rotate the Selector to position the cursor where the next character is to be placed and press the Selector to obtain the character list again. Repeat until the flight mode name is completed.
4. Use the roller to highlight the * below the flight mode name and press the roller to select up to four characters from the above flight mode to be automatically displayed on the main screen when that flight mode is selected.
5. Return to the SYSTEM Menu by pressing the LIST button.

86: Transfer

The TRANSFER function allows one 12X transmitter to transfer a model memory for a specific model to another 12X transmitter. This function is also used to transfer a model memory to the included PC data transfer allowing unlimited model memory storage and backup of your model's programming (see page S-15 for details on using the PC data transfer). The Transfer function is also used to receive data from another 12X or from the PC Data Transfer.

Note: The sending and receiving transmitters must both be 12X's, or the PC Data Transfer device and a 12X. Transfer is not possible with any other system.

Preparing the 12X to Receive a Model Transfer

1. Hold the ENT button while plugging the DSC cord into the back of the transmitter to obtain the SYSTEM List. Plug the other end of the DSC cord into another 12X transmitter while holding the ENT button and after the following, prepare that transmitter for transfer send as described above.
2. Highlight and select TRANSFER in the SYSTEM Menu to obtain the Transfer display.
3. If RECEIVE is already displayed, continue with the next step. If TRANSMIT is displayed, highlight and select TRANSMIT, changing it to RECEIVE.
4. Select the model memory that is to receive the data by highlighting and selecting the model name/memory number and then scrolling to and selecting the model memory that is to receive the data. Select an unused model memory or a memory that contains data for a model that is no longer needed, as the data in this model memory will be replaced by the model memory that is transferred and will be permanently lost.

   Note: The receiving model name/memory number can not be the currently selected model. If you wish to receive a model in the currently selected model name/memory number, go to the model select function and select a different model, then re-enter the transfer function and follow the instructions above.
5. Press START on the left side of the display. Stand-by appears at the bottom of the display indicating that the system is ready to receive data. Follow the next steps to prepare the sending transmitter for memory transfer.

1. With the other end of the trainer cord plugged into the sending 12X transmitter in SYSTEM List as described in step 1. above, highlight and select TRANSFER (code 86) in the SYSTEM Menu to obtain the Transfer display.
2. The model to be transferred must be the currently selected model. If the model to be transferred is not currently selected, see Model SEL in the SYSTEM Menu to select the model to be transferred.
3. When the receiving 12X is ready, press START on the left side of the display. The data for the currently selected model is transferred to the receiving device.

97: Warning

The Warning function can be programmed to sound an alarm if a selected flight mode, switch position or spoiler stick position is in an inappropriate position when the transmitter is turned on. For example if another flight mode is selected other than launch when the transmitter is turned on, an alarm can sound warning that the switch is in an inappropriate position to launch the sailplane. If the spoiler stick is below a preprogrammed position when the transmitter is turned on, an alarm will sound. See page S-17 for programming stick position switches. Note that during the warning, no signal is being transmitted. The warning function is available for the following:

- Flight Mode Cruise
- Flight Mode Speed
- Flight Mode Thermal
- Flight Mode Launch
- Flight Mode Land
- AX2 Up
- Elevator 1
- Elevator 2
- Motor
- Butterfly
- Stick Position Switch 0
- Stick Position Switch 1
- Stick Position Switch 2
- Stick Position Switch 3
- Spoiler Stick Position

To Program a Warning

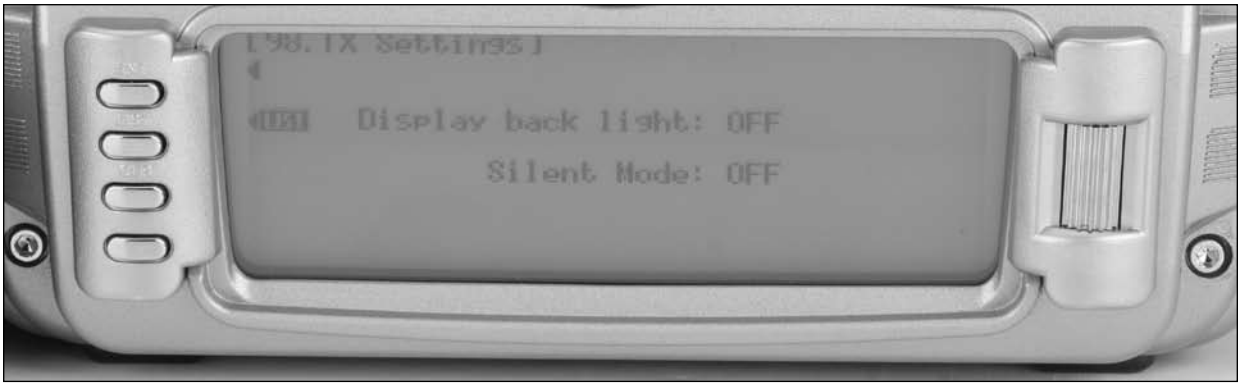
1. In the SYSTEM MODE, highlight and select Warning using the Roller.
2. Highlight the desired flight mode, switch position or stick position switch (SPS) then press the roller to turn on off that function as a warning.

   Note: It is possible to activate multiple functions as a warning.

   Note: To select a Stick Position Switch as a warning, it is first necessary to activate the stick switch. See Stick Switch Position Code 91 on page S-13 for more details.
3. If a spoiler stick position is desired as a warning, highlight INH next to SPOI STICK and press the roller to activate the spoiler stick position. Rotate the roller to select POS and adjust to the desired value that you wish to have the warning sound. Note that 0= low spoiler, 50 = 50% spoiler, etc. ON/ OFF is displayed at the top of the screen and when moving the stick this will indicate that the function is on/off.
4. Use the roller to select ON; select Low or Hi to have the alarm sound above or below the POS position.
5. Return to the SYSTEM Menu by pressing the LIST button.

98: Settings

The Settings program allows the screen backlight to be turned on/ off or placed in auto (sleep) mode. This function also allows the audible beeper to be turned on or off. Theses functions are defaulted to Backlight Auto and Silent mode off.



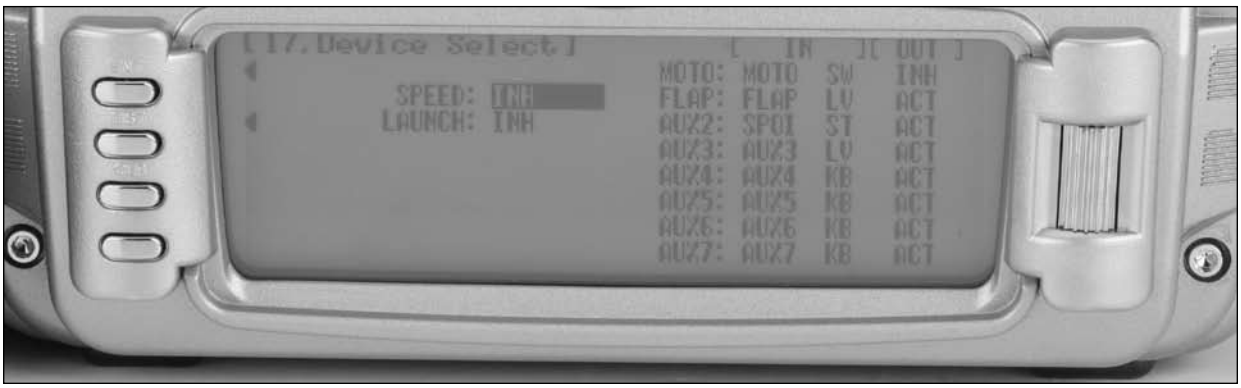
To Change Transmitter Settings

1. In the SYSTEM MODE, highlight and select Settings using the Selector.
2. Highlight the desired function. Display back light or Silent Mode using the roller then press the roller to access and change the settings.
3. Return to the SYSTEM Menu by pressing the LIST button.

17: Device Select

Device Select is used to activate some of the more advanced features of the 12X. The Device SEL function is used to activate/ inhibit the following:

- Flight Modes (5 in total)
- Aileron and rudder common trim
- Switch, Lever and Knob assignments
- Activate/inhibit switches/channels
- Activate/inhibit the Motor function
- Assign functions and channel to the desired switch knob or lever



Flight Modes

A Flight Mode represents an aircraft configuration (camber position, trim positions, Dual Rate/Expo settings, program mixes, aileron differential value, etc.) that is programmed to optimize the aircraft for a particular task. Up to 5 flight modes are available in the 12X that include Launch, Cruise, Speed, Thermal and Land.

The objective of programming Flight Modes is to provide the ability to select a switch position to activate a collection of settings that are optimized to perform a particular task. For example, the launch mode is typically set up to give the following:

- The flaps and flaperons are preset with positive camber to give more lift during launch.
- An elevator preset trim position that gives the best climb is programmed.
- A high rudder rate with reduced exponential to give authoritative steering control on launch is desired, while the elevator and aileron rates are set to give a medium response.
- Aileron-to-rudder mix is turned off, as are landing flaps and elevator-to-flap mix while camber adjustment of the side lever is programmed to give proportional camber changes to allow for last minute adjustments based on wind and winch conditions.
- Aileron differential is set at 50%.

All these (and many more) programming parameters can be selected by simply moving one switch. At the top of the launch you prepare to zoom by switching to the cruise mode. A single flip of the switch neutralizes the trailing edge while giving the correct elevator trim for cruise. Rudder-to-elevator and elevator-to-flap mixes automatically turn on the programmed values and the aileron differential is now at a much higher 75% for more coordinated thermal turns. At the flip of a single switch you're ready for a zoom launch and for hunting thermals! And remember there are 3 more flight modes available. Once you start using flight modes, you'll wonder how you ever flew without them.

Most of the functions found in the 12X that are switch selectable, including Flaperon Mix, Servo Speed, Camber system, Differential, Aileron to rudder mix, Elevator to flap mix, Flap rate, Brake system, trims and programmable mixes, can be assigned to one or more Flight Modes. This provides the ability to have up to 5 completely different aircraft configurations that are selectable in flight using switches.

Five Flight Modes are available in the 12X system. When 3 Flight Modes are activated, they are selected during flight by using one of seven 3-position switches (Flight mode switch, Motor switch, Butterfly switch, Rudder D/R switch, Elevator D/R switch, Aux 2 switch, Aileron D/R switch or Inhibit). To activate the 2 Extra flight modes (5 flight modes in total), the 4th and 5th flight modes are assigned to one of the following switches (Flight Mode, Rudder D/R switch, Elevator D/R switch, Flap Switch, Aux 2 switch, Aileron D/R switch, Inhibit). Flight mode switches are selected and activated in the Device SEL function in the System menu. Once Flight Modes are activated, the pilot has a choice of using the Flight Mode switch to select up to 5 Dual Rates and Exponential settings for each of the primary controls (ELEV, AILE, RUDD), or Dual Rates and Exponential settings may continue to be controlled by the 3 individual Dual Rate switches. All other functions that can be activated by a switch can be assigned to 1 or more Flight Modes when Flight Modes have been activated.

Activating and Assigning Primary Flight Modes

In the factory default setting, all flight modes are inhibited. Flight modes are activated and assigned to the desired switch position using the SPEED and LAUN functions in the Device SEL screen.

In system mode list rotate the Selector until Device SEL is highlighted. Press the Selector to access the Device Select screen.

To activate the launch, cruise and land mode, rotate the Selector until LAUN is highlighted and then press the Selector. The following screen will appear: Device select w/ Launch screen.

At this point, you must decide which 3-position switch you prefer to assign the flight mode to. When a 3-position switch is selected, the launch, cruise and land will be activated. We recommend starting with the Flight Mode Switch (left top 3 position switch), as this is a convenient place. Rotate the Selector until the desired switch is highlighted and press to select.

Activating and Assigning Additional Flight Modes

To activate the speed and thermal flight modes, highlight SPEED and press the Selector to select the desired switch position.

Important: When the Speed and Thermal flight modes are activated, launches always have priority. Any time Launch is selected it will override Speed, Thermal or Cruise. To access Speed or Thermal, the Launch switch must be in the middle position. Try selecting the various flight modes several times while looking at the main info screen and you'll quickly become familiar with the switch priority.

Note: On the main info screen, the flight mode that is activated will be displayed on the top center of the screen.

Aileron and Rudder Common Trims

The aileron and rudder trims can be programmed to operate independently in each flight mode (FMOD) or commonly, such that a rudder or aileron trim change will affect all flight modes (COM). Device select Aileron and rudder trim screen.

To select the aileron and rudder trims, highlight FMOD next to AILE/RUDD and press the Selector to select the desired trim position.

Motor Function

The motor function can be assigned to operate from several different switches, buttons or the Spoiler stick. In Device Select, highlight MOTO SW and press the Selector to access the available switches that can be programmed to operate the motor.

Select the desired switch by highlighting it and press the Selector.

Note: Also see Motor Hold on page S-25 for more details.

Flap and AUX Functions

The Flap and Auxiliary channels can be assigned to operate from several different switches, buttons or the throttle stick. In Device Select, highlight the desired Flap or Aux function and press the Selector to access the available switches that can be programmed to operate each function.

Select the desired switch by highlighting it then press the Selector.

Activating / Inhibiting Channels

Channels 5 through 12 can be inhibited, allowing them to be used as slave channels, in programmable mix. Highlight the desired ACT/INH next to the appropriate channel. Press the Selector to inhibit or activate the channel.

22: Wing Type

This Wing Type function is used to establish the programming for wing and tail types. The Wing Type program allows the activation of V-tail, Tip ailerons, dual elevators, dual rudders, dual flaps and dual spoilers.

Note: In order to activate any of the Dual Mate functions (dual elevator, rudder or flaps), channels must be inhibited in 17. Device Select. See page S-18 for details on activating and inhibiting channels.

To access Wing type in System mode list, rotate the Selector to highlight Wing TYPE. Press the Selector to access the wing type screen.

If your sailplane has a V-tail, activate the V-tail function by highlighting INH and pressing the Selector.

If your sailplane has Tip ailerons, activate the Tip aileron function by highlighting and pressing the selector. Italics, etc. ?

If your sailplane has dual elevators, dual rudders or dual flaps, activate the function by highlighting INH and pressing the Selector; then highlight the desired channel.

Function Mode

The Function Mode contains programming that is used to complete the setup and then to adjust the sailplane's flight characteristics. Functions include Servo Reversing, Travel Adjust, Dual Rate and Expo, Sub Trim, Servo Speed, Flaperon mixes, Camber system, Differential, Programmable Mixes, Gyro programming, brake system, Trainer and Timer functions, etc. Many of these functions are frequently used to adjust the flight characteristics during set up and at the field.

To Enter the Function Mode List

With the transmitter on, press LIST and the Function list will appear.

11: Servo Reversing

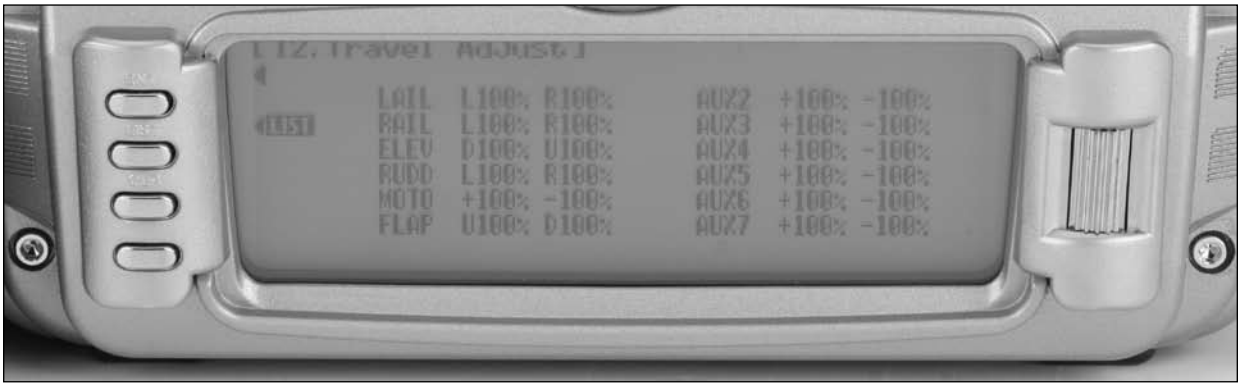
The servo reverse screen allows the direction of each servo to be selected.

To Program Servo Reverse

1. Highlight and select REV.SW in the FUNC.LIST to obtain the servo reversing display.
2. Use the Selector to highlight and select those channels that need to be reversed. Pressing the Selector toggles the channel between Normal and Reverse.

12: Travel Adjust

Travel Adjust allows the independent adjustment of servo travel for each direction of servo travel.



To program Travel Adjust values:

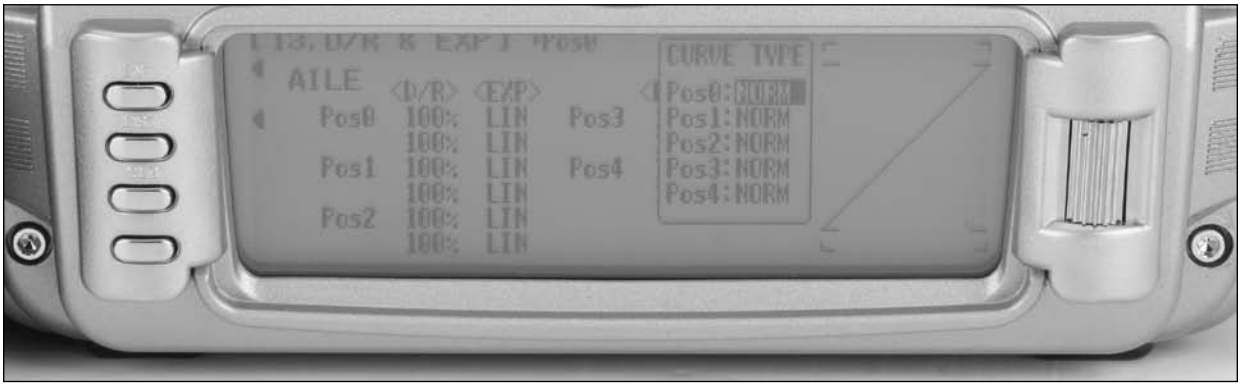
1. Highlight and select TRVL ADJ. in the FUNC.LIST to obtain the Travel Adjust display.
2. Use the Selector to highlight and select each channel and adjust the travel in each direction by rotating the Selector. The direction of travel is changed by moving the stick/switch/lever in the desired direction to highlight L/R, U/D or +/-.

13: Dual Rate and Exponential

Up to five dual and exponential rates are available and are selectable via flight modes (up to 5) or Dual rate switches (up to 3). In addition, various response curves including VTR (variable trace ratio), Linear/ Exponential and Exponential/ Linear curve types are available to allow the tailoring of the output curve. Dual and Expo rates are independently adjustable in each direction by moving the appropriate stick in the desired direction.

To Program Dual Rate and Exponential Functions

1. Highlight and select D/R & EXP in the FUNC.LIST to obtain the Dual Rate and Exponential display.
2. Highlight and select the displayed channel (upper left) and select Aileron, Elevator or Rudder.
3. Use the Roller to select and change the desired D/R and expo values for each position. Positions correspond to the dual rate switch positions or can be programmed to automatically operate in each flight mode (AUTO). Note that D/R and Expo values can be independently adjusted by holding the corresponding control stick in the desired direction while making adjustments.



Note: VTR or Variable Trace Rate curves combine two slopes. The intersection point of the two slopes is determined by VTR% selected (VTR60 gives an intersection point at 60%). The slope (rate of change) is adjusted with the D/R percentage.

4. To Select a Curve Type highlight CURVE TYPE. POS 1 thru 5 will appear on the screen. Using the roller, select the position of the curve type that you would like to change. Press the roller to select VTR50, VTR60, VTR70, VTR80, VRT90, LIN/ E (Linear/ Expo), EXP/ L (Expo/ Linear).

AUTO function

5. The AUTO function automatically selects Dual Rate and Expo setting in each flight mode. If the AUTO function is desired, highlight the desired switch under AUTO and select SW for Dual Rate switch or the desired D/R position to automatically activate that selection when the corresponding flight mode is selected. The active flight modes will be displayed. Select SW (D/R switch), or POS 0 through 4 and that position will be active when the corresponding flight mode is selected.

15: Sub Trim

Use Sub Trims to fine-tune the output alignment of the servo arms.

To Program Sub Trim Values

1. Highlight and select Sub Trim in the FUNC.LIST to obtain the Sub Trim Display.
2. Highlight and select the channels where the sub trims must be adjusted. Once a channel is selected, rotate the Selector until the servo arm is in the desired position.

Motor Hold

Note: This function is only available when the motor is programmed to the spoiler stick in the Device Select menu. See Device Select Pg S-18.

The Motor Hold feature allows the spoiler stick to be used for multiple functions. In one mode (Launch Mode, for example) it can be used as a proportional throttle for an electric motor and switching to another mode (Landing) the spoiler stick can be used as landing flaps. When the Motor Hold mix is on, the Throttle Hold program holds the throttle in the desired position (usually motor off).

To Access Motor Hold in the Function List

1. Rotate the Selector until MOTO. HOLD is highlighted. Press the Selector to access the Motor Hold menu.
2. Rotate the Selector to highlight desired flight mode or switch, and then press the Selector to access on or off.
3. Adjust the motor value to achieve the desired throttle position for that flight mode or switch. Press the LIST button to return to the Function Mode screen.

Note: The AND function requires that all selected switches be on in order to activate the Motor Hold function. If AND is left Off, then only one of the selected switches must be on to activate the Motor Hold function.

21: Flaperon Mix

Flaperon Mix Combines four mixes in one screen. Mixes include Flap-to-Flaperon mix, Flap-to-Elevator mix, Aileron-to-Flap mix, and Aileron-to-Tip aileron mix if the tip ailerons are activated in the wing type function. The flap lever-offset position is programmable allowing pilots to choose the neutral position. The flap functions can be programmed to one of many different levers or switches in the Device Select screen. The default is the left lever. Mix values are based on a percentage of the flap values so until a flap value is programmed in code 69. Flap rate, the Flaperon Mix function will not operate.

To Access Flaperon Mix

1. In FUNC.LIST rotate the Selector until Flaprn MX is highlighted. Press the Selector to access the Flaperon Mix menu.
2. Highlight Flap LV Offset and program the desired Flap lever offset. This value establishes the center point at which the up/ down or left/right mix occurs. 0= center position.

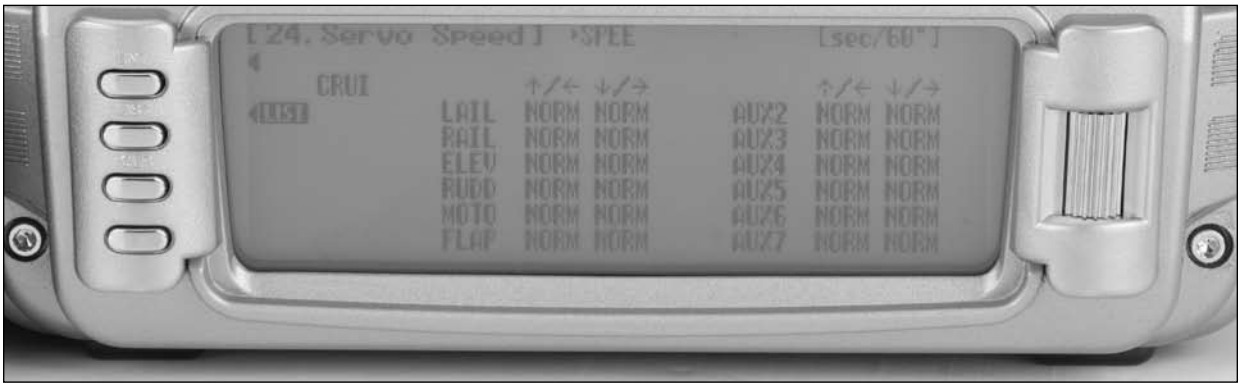
   Note: The flap is defaulted to the left lever but can be changed in Device Select.

3. Rotate the Selector to highlight the desired value then press the Selector to access this value. With the flight mode switch in the corresponding mode, move the programmed flap lever to the appropriate position and adjust the value to the desired flap position. Repeat this for all desired flight modes and flap positions.
4. Press the LIST button to return to the Function Mode screen.

   Note: Mix values are based on a percentage of the flap values so until a flap value is programmed in code 69. Flap Rate, the Flaperon Mix function will not operate.

24: Servo Speed

The 12X provides the ability to adjust the speed of servos for each channel in each direction. The speed may be reduced (servo slowed) from its normal speed but it cannot cause a servo to move faster than its rated specifications. Each servo can have 2 sets of speeds in each direction that are Flight Mode or switch selectable.



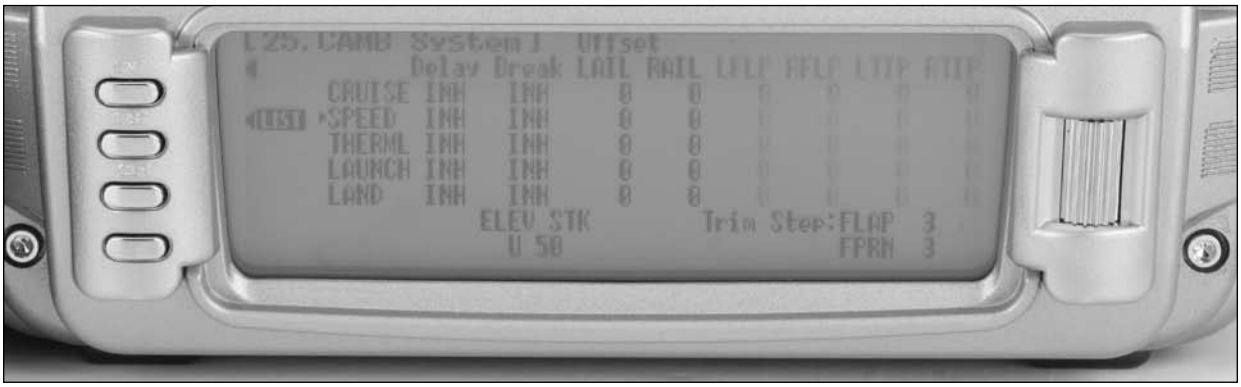
To Adjust Servo Speed

1. Highlight and select SRV. Speed. Speed FUNC.LIST.
2. If flight modes are not programmed, select SW SEL and press the roller to access Switch Select. If only one servo speed is desired, then all selectable switch positions in this screen should be P0. If two servo speeds are desired, then assign the desired switch that will change the servo speed to P1. Return to the main screen.
3. If a single set of servo speeds is desired, make sure the display is showing Pos0. If it is not, select Pos1 and change it to Pos0. Highlight and select the channel and direction for each servo that is to be adjusted. Once a direction for a servo is selected, the servo speed may be set so the servo travels from .193 seconds for 60 degrees of rotation to 16.4 seconds for 60 degrees of rotation. Adjust the speed of each servo until the desired speed is obtained.
4. If 2 sets of servo speeds are desired that are Flight Mode or switch selectable, one set of values is set to NORM for all channels; slowing of servos can be turned off by selecting the position (Pos0 or Pos1) that has the NORM values. Highlight and select Pos0 and change it to Pos1 and then highlight and select the channel and direction for each servo that is to be adjusted. Once a direction for a servo is selected, the servo speed may be set so the servo travels at the desired slower rate. Switch between Pos0 and Pos1 to view and adjust the 2 sets of values for each servo.

   Note: Pos1 always has priority over Pos0. In other words, if multiple switches are selected and one of the switches is in its Pos1 position, then all other switches are ignored and the Pos1 values are in effect.
5. If flight modes are programmed, using the roller highlight the flight mode then press the roller. Rotate the roller to access the desired flight mode then select the servo speed desired for that flight mode. Repeat for all flight modes.

25: Camber System

The Camber system allows preset camber adjustments for each programmed flight mode for the right and left ailerons, the right and left flaps, and if activated the right and left tip ailerons. The camber system allows for adjustments to the preset camber setting for each flight mode that is automatically selected with each flight mode. A Delay function is available that causes the smooth transition of the control surfaces from one flight mode to the next plus a Break function is available that will reduce the camber at a preset elevator stick position. Flap and Flaperon trim steps are also adjustable in the Camber system. Mix combines four mixes in one screen. Mixes include Flap-to-Flaperon mix, Flap-to-Elevator mix, Aileron-to-Flap mix, and Aileron-to-Tip aileron mix if the tip ailerons are activated in the wing type function. The flap lever-offset position is programmable allowing pilots to choose the neutral position. The flap functions can be programmed to one of many different levers or switches in the Device Select screen. The default is the left lever. Mix values are based on a percentage of the flap values, so until a flap value is programmed in code 69. Flap rate the Flaperon Mix function will not operate.



To Access the Camber System

1. In FUNC.LIST rotate the Selector until CAMB SYS. is highlighted. Press the Selector to access the Camber System menu.
2. If you wish to program a Break point with elevator input (reduces camber with elevator input), then highlight Elevator STK and program the desired Elevator offset. This value establishes the point at which the reduction of camber will occur.
3. Rotate the Selector to highlight the desired value then press the Selector to access this value. With the flight mode switch in the corresponding mode, adjust the value to the desired position for each control surface. Repeat this for all desired flight modes and control surface positions.
4. If desired, a delay can be programmed that will smoothly transition the control positions when changing from one flight mode to the next. The adjust range is from INH to 6.0 seconds or hold.
5. Press the LIST button to return to the Function Mode screen.

32: Differential

The 12X Aileron Differential function reduces the travel of the Aileron that deflects downward without affecting the Aileron that travels upward, eliminating adverse yaw effects and improving coordinated turns. The Brake Differential function is programmable that reduces the aileron differential when the crow/butterfly, spoiler stick is deployed; it is helpful for maintaining aileron authority during spot landings.

The Aileron Differential function provides for up to 5 Differential and Brake Differential settings that are Flight Mode selectable. When flight modes are activated in Device Select (see page S-18), the differential screen displays an Aileron Differential Value and Brake Diff. Value for each flight mode that will automatically be selected via the flight mode switch.

To Use the Aileron Differential Function

1. Highlight and select AIL Diff. in the FUNC.LIST to obtain the Aileron Differential display.
2. If no flight modes are activated, a single Aileron differential and Brake Diff setting is available. Highlight the AILE or Brake DIFF to program the desired values. A positive differential value causes the downward Aileron to travel less (normally used) while a negative value causes the upward Aileron to travel less (negative differential). Brake Diff value reduces the differential as the spoiler stick is deployed.
3. If Flight modes are activated (see Device Select page S-18), Differential and Brake Diff values can be assigned for each flight mode and are automatically activated via the flight mode switch.

33: Balance

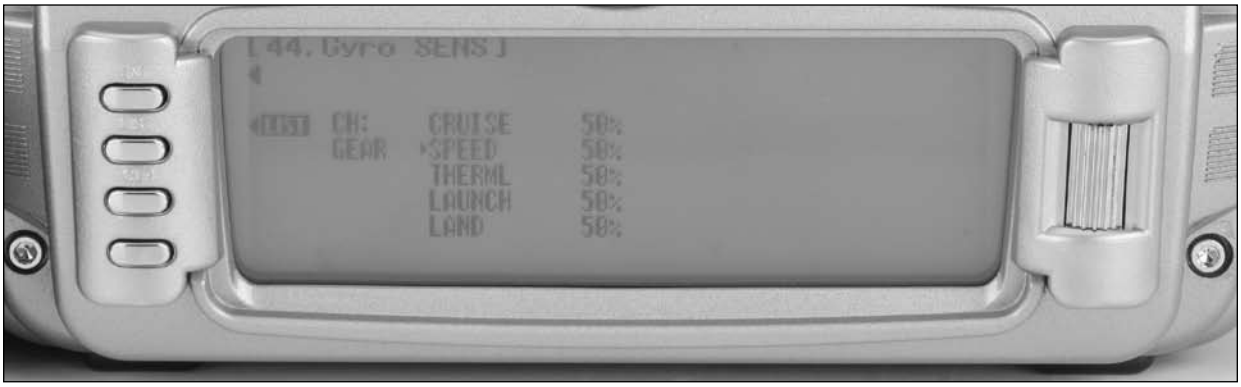
The 12X features a Balance function that allows the servo outputs of dual channels to be adjusted throughout the range. This is useful when two servos are used to drive a single surface (i.e. two aileron servos used to drive one aileron), and the linkage geometry of each servo is slightly different (typical with a tapered aileron). If both servos are mixed in a linear fashion, binding will occur throughout the control range due to linkage geometry inaccuracies. The Balance function allows the servo output of the master servo to be adjusted at 7 points throughout the range, compensating for any linkage geometry inaccuracies. Think of Balance as a curve mix that allows the master channels to be independently adjusted at seven different points, allowing a perfect bind-free setup throughout the control stroke.

To Program the Balance Function

1. Highlight and select Balance in the FUNC.LIST to obtain the Balance display.
2. Note that the Balance screen will display the functions that are programmed in the Wing Type. If no dual functions are programmed in Device Select, then only one aileron column will appear in the balance screen. If dual flaps are programmed then two columns will appear in the balance screen. This also applies to the dual elevator and rudder functions.
3. Using the roller, highlight the desired position and press the roller to access the value. Rotate the roller to change the output position that is selected. The range is +100 to -100. Repeat this for all positions until no binding occurs throughout Control Travel.

44: Gyro Sensor

The 12X features a Gyro Gain system that allows for the individual in-flight selection of gain setting for each active flight mode. To access the Gyro function, at least three flight modes must be activated in Device Select and the Moto channel (CH 5) must be programmed to GYR in device select code 17 and the gyro gain lead must be plugged into the Moto (channel 5) receiver port.



To Access the Gyro Sensor

1. Highlight and select GYRO SENS. in the FUNC.LIST.
2. Use the Rolling Selector to select the gain position to be adjusted, and then press and roll the Rolling Selector to increase or decrease the gain values as needed. Gain setting will automatically be selected via the flight mode switch.

46: Rudder-to-Spoiler Mix

The Rudder-to-Spoiler mix causes the spoiler to move in unison with rudder. This mix can be utilized to improve the turning/ handling characteristics, especially on landings. Rudder-to-Spoiler mix values can be independently adjusted for each of the 5 flight modes.

Note: Dual spoilers must be activated in Wing Type in order to access the Rudder-to-Spoiler mix.

To Access Rudder-to-Spoiler Mix

1. In FUNC.LIST rotate the Selector until RUDD→SPOI is highlighted. Press the Selector to access the Rudder-to-Spoiler mix menu.
2. Rotate the Selector to highlight the desired value corresponding to the flight mode and then press the Selector to access that value. With the flight mode switch in the corresponding mode, give a rudder command and rotate the Selector to achieve the desired spoiler mix value. Pressing the Selector will store the value.
3. Press the LIST button to return to the Function Mode screen.

62: Aileron-to-Rudder Mix

Aileron-to-Rudder mix causes the rudder to move in unison with the ailerons. It is utilized to reduce adverse yaw and to improve the turning/ handling characteristics. Aileron-to-Rudder mix values can be independently adjusted right and left for each of the 5 flight modes.

To Access Aileron-to-Rudder Mix

4. In FUNC.LIST rotate the Selector until AIL→RUD M is highlighted. Press the Selector to access the Aileron-to-Rudder mix menu.
5. Rotate the Selector to highlight the desired value corresponding to the flight mode and desired direction and then press the Selector to access that value. With the flight mode switch in the corresponding mode, give an aileron command and rotate the Selector to achieve the desired rudder value. Pressing the Selector will store the value.
6. Elevator and rudder break points are programmable and reduce the aileron-to-rudder mix when the elevator or rudder stick is displaced.
7. Press the LIST button to return to the Function Mode screen.

63: Elevator-to-Flap Mix

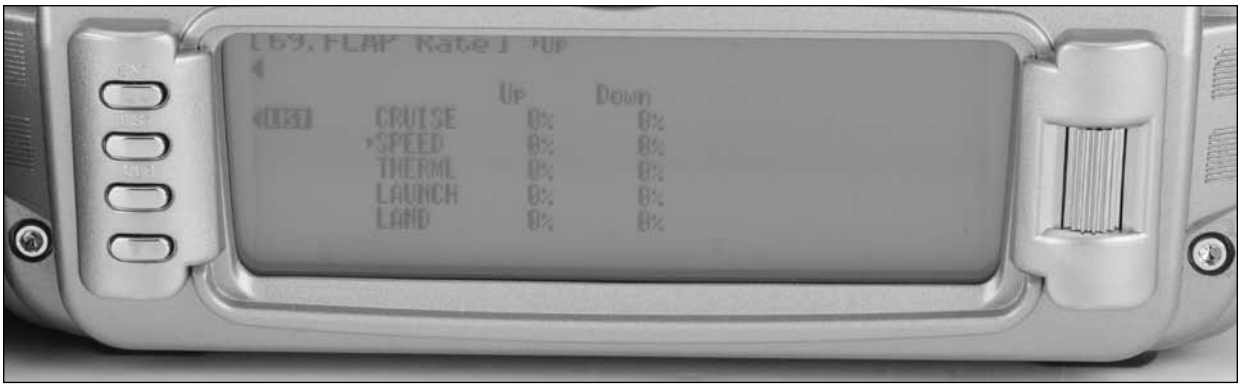
Elevator-to-Flap mix is normally used to give several degrees of down flap when up elevator is applied. This gives more pitch authority than would elevator alone, and is commonly used for slope racers to improve high-speed turns and in thermal sailplanes to allow increased maneuverability for tight thermal turns. An offset is available that allows the programming of snap-flaps. With snap-flaps, no flap mixing occurs during small to medium up elevator inputs, but at about offset point of up elevator, the flaps are mixed to give down flaps, causing greater up pitch authority.

To Access Elevator-to-Flap Mix

1. In Function Mode list, rotate the Selector until ELE→FLP M is highlighted. Press the Selector to access the Elevator-to-Flap mix menu.
2. Note that Elevator-to-Flap mix values are available for each active flight mode and the Elevator-to-Flap values can be independently adjusted up and down. Also the offset (the stick position where the mixing changes from up to down) can be adjusted. This offset allows the programming of snap-flaps, a common sailplane function that gives greater full up elevator pitch authority for tighter turns. If you choose to program snap-flaps, the offset adjustment range is -200 to +200. Negative values move the offset in the up elevator direction. Switches are available at the bottom of the screen that allow the selection of Pos0 or Pos1.

69: Flap Rate

The Flap Rate function adjusts the up and down flap travel when using the Flap Lever (default) or which ever lever or switch is selected to operate the flaps in Device Select Code 17. Each flight mode that is activated in Device Select code 17. will be displayed with a up and down value in the Flap Rate screen. The adjustment range is +125% to-125%. Flap Rate is used in conjunction with the Flaperon Mix function Code 21. to adjust the desired camber setting ranges when using the flap levers for each flight mode.



To Access the Flap Rate Function

1. In Function Mode list, rotate the Selector until FLAP Rate is highlighted. Press the Selector to access the Flap Rate function.

   Note: Flap values are available for each active flight mode and the values can be independently adjusted up and down.

2. Rotate the selector to highlight the desired value next to the intended flight mode and press the roller.
3. Rotate the roller to adjust the flap value.

71: Brake System

The Brake System is the landing program that mixes the spoilers, flaperons, flaps, and tip ailerons (if equipped) and elevator to the spoiler (throttle) stick. Two values are available, Pos0 and Pos1; each can be assigned to several different switches or flight modes. An offset is provided (SPOI Pos.) to allow the user's preference for the neutral position (normally stick up).

To Access the Brake System

1. In FUNC.LIST rotate the Selector until Brake SYS is highlighted. Press the Selector to access the Brake System.

   Note: The default setting for Spoiler offset Position is at +100%. With this setting, the flap's neutral position (trailing edge level) occurs when the spoiler stick is in the full up position. If you choose to locate the neutral position in the down position, the value would be –100%.

2. Rotate the Selector to highlight SW select and press the Selector to access the available switches.

3. To access the various values, rotate the Selector to highlight them then depress the Selector to access the value. Move the spoiler stick to the full down position and adjust the value by rotating the Selector until the desired position is achieved. Press the Selector to store the value.

4. The BRAKE→ELEV mix allows up to 7 points to be stored and programmed. Two positions are available. This system allows several points on a curve to be adjusted for Flap-to-Elevator mixing.

5. Press the LIST button to return to the Function Mode screen.

51 thru 58: Programmable Mixers

Programmable mixers are programmed to cause a second or slave channel to react as a result of providing input to the primary or master channel or to cause a channel to be controlled by moving a switch or lever. Programmable mixes are typically used to activate special aircraft functions like tow hook releases, snap flaps, Flap-to-Elevator curve mix, and mixes to correct for flight dynamics.

The 12X provides 3 Standard programmable mixes (PROG. MIX1 - PROG.MIX3) and 5 Multi-Point or Curve programmable mixes (PROG.MIX4 - PROG.MIX8). Multi-Point (or Curve) Mixing provides the ability to program a customized curve that the Slave channel will follow as it reacts to the Master channel's input. Multi-Point mixes are different from Normal Mixes in that Normal Mixing results in a linear movement of the Slave channel in relation to the Master. With Multi-Point Mixing there are up to 8 points that can be adjusted to control the position of the Slave channel, providing the ability to custom tailor the output of the slave channel.

The primary channel is called the Master channel, while the channel that reacts to the Master is called the Slave channel.

Mixes are fully programmable, allowing any of the 12 channels to be Master, Slave or both (a channel can be mixed to itself). Trimmers and levers can also be used as a master and are extremely useful for programming a proportional channel to be operated via a trimmer or lever. Additionally programmable mixes can always be on, or turned off and on via a programmed switch, stick position or flight mode. The Snap Roll/ Trainer, ? switch (momentary switch SNPT) can also be programmed as the Master channel.

Additionally There are Two Options for Master Channels

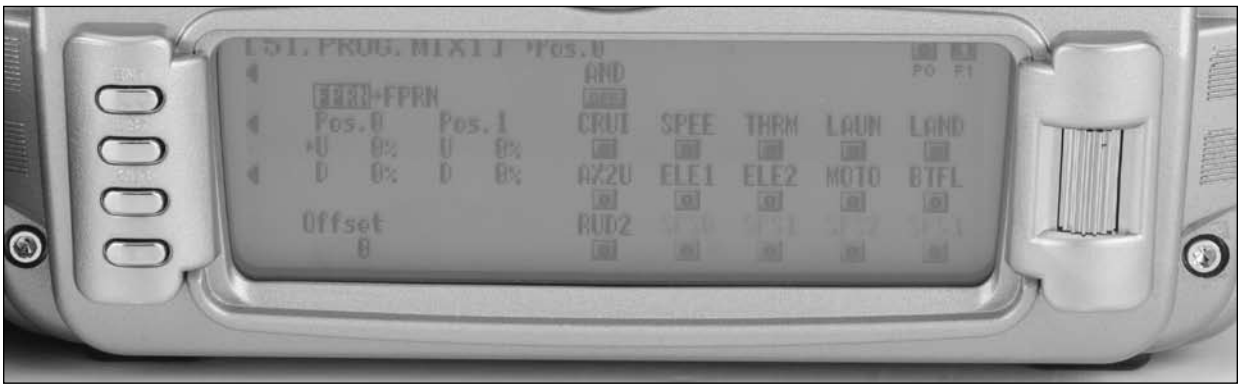
"#" (pound sign) – these Master channels are Origin-type mixes. These include #THRO, #AIL, #ELE, and #RUD. Origin mixing bypasses any other mixing that might affect that channel such as throttle curves, exponential, travel adjust or other programming and uses the stick position only to control the mix.

"+" (plus sign) – these Master channels are trim-include type-mixes. These include THR+, ELE+, AIL+, and RUD+. Trim Include mixes include the trim of the Master channel as well as any other mixing to the Master channel to control the Slave channel of the mix.

Standard Programmable Mixer - (Std. Prog Mixer)

The 12X has 3 standard programmable mixers that allow for linear mixing of a Master channel to a Slave channel. The standard mixers are PROG.Mix1, Mix 2 and Mix 3.

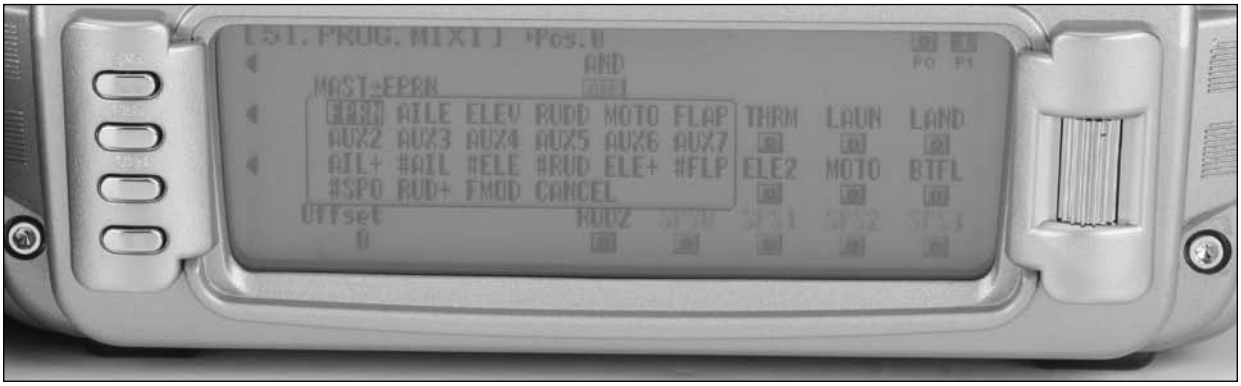
These mixes provide for 2 sets of mixing values named Pos0 and Pos1. If one set of values is set to 0% then the mixer can be turned On and Off with a stick, switch or lever. Each set of mixing values is comprised of 2 percentages to accommodate movement of the Master channel in both directions. This is shown in the illustration below where there is an upper and lower percentage for both Pos0 and Pos1.



A mix can be made to always be on by setting Pos0 values only and not selecting any switches to switch between the Pos0 and Pos1 values.

Master Channel - (Std. Prog Mixer)

The Master channel is the primary or controlling channel. The default for both the Master and the Slave channel is THRO. The Master channel is selected by highlighting and selecting this parameter to obtain a list of channels and then selecting the Master channel from the list.



Note: There are 4 channels that appear more than once. They are Throttle, Aileron, Elevator and Rudder. Since these channels can be influenced by Dual Rate and Exponential settings, they are included in the list twice - once where the D/R and EXP settings are in effect and again where the D/R and EXP settings are ignored. The second time they are listed, there is a special designator to indicate that these channels can also be used as a Master while bypassing any Dual Rate and Exponential settings that may be associated with them. They are designated by a # (pound sign) in front of the name - #THRO, #AILE, #ELE, and #RUD. When one of these channels is selected as the Master, all D/R, EXP and Curve settings associated with the Master are ignored during the mixing operation. Instead, the mixer reads only the physical position of the stick to perform mixing.

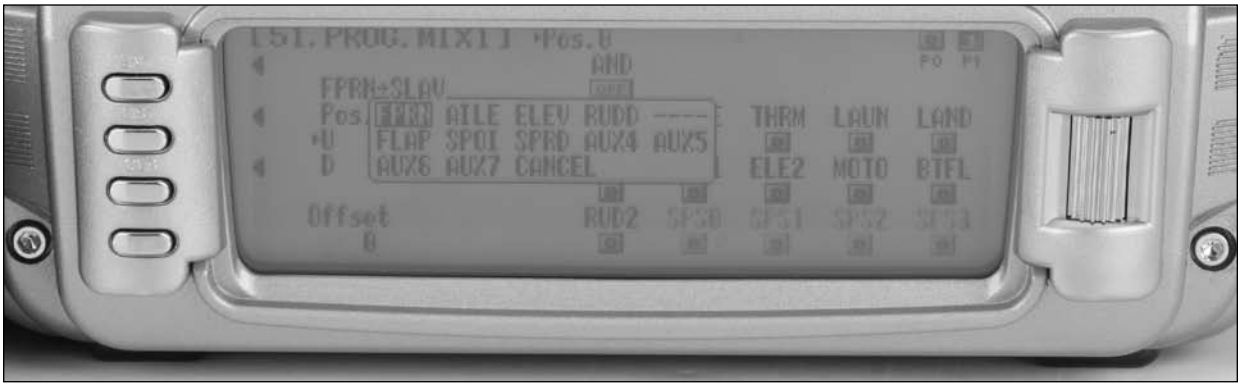
A (+) behind the channel indicates a trim include function. By selecting a channel with the (+) the trim lever affects both the Master and Slave channels.

Note: Some programmable mixes have + appearing after a specific channel and other mixes have a # before that specific channel. Choose the programmable mix that offers the type of mix (origin of trim include) that you desire.

Slave Channel - (Std. Prog Mixer)

The Slave channel is the secondary receiving channel and will move according to the program mix in relation to the Master channel. The default for both the Master and the Slave channel is THRO.

The Slave channel is selected by highlighting and selecting this parameter to obtain a list of channels and then selecting the Slave channel from the list. The list contains each of the 12 channels in the system and CANCEL.



Switch Position

The right side of the Programmable mix screen displays the available switch options. If you choose to have a switch control the mix, either on/off or have two mix values, highlight and select the desired switch(s) and select position 0 or 1. Each standard programmable mixer has two positions - Pos0 and Pos1 and each position has 2 percentages (upper and lower) to accommodate mixing when the Master is moved in both directions. Note that POS 1 has priority over POS 0.

Offset

Offset defines the position where the mixer changes directions. The Offset is defaulted to center position or 0 and this is most commonly used. With a 0 Offset, if the Rudder is the Master, moving the rudder stick to the left of center causes a mix in one direction while moving the rudder stick to the right of center causes a mix in the other direction. Directions correspond to the upper and lower percentages for Pos0 and the upper and lower percentages of Pos1. The amount of mix and actual direction that the Slave moves is determined by the Pos0/Pos1 values. The Offset applies to both Pos0 and Pos1 settings.

The Offset may be changed by highlighting and selecting Offset and adjusting either a positive (+) or negative (-) value. A positive percentage moves the Offset in one direction from center while a negative percentage moves the Offset in the other direction from center.

Mix Values

Each standard Programmable mixer can have two sets of mixing values - Pos0 and Pos1. Each set can have 2 percentages which control movement of the Slave when the Master is moved in each direction. A switch can be selected to switch between the Pos0 and Pos1 percentages.

The Pos0 settings determine how far, and in which direction, the slave channel moves when the Master is moved above and below the Offset (the Master moving in both directions) when the switch is in a position to select the Pos0 values.

To enter Pos0 values, highlight and select Pos0, move the Master channel control (stick, lever or switch) in one direction and set the percentage and then move the Master channel control in the other direction and set its value.

The Pos1 settings are identical to the Pos0 settings and determine how far, and in which direction, the Slave channel moves when the Master is moved above and below the offset (the Master moving in both directions) when the switch is in a position to select the Pos1 values.

To enter Pos1 values, highlight and select Pos1, move the Master channel control (stick, lever or switch) in one direction and set the percentage and then move the Master channel control in the other direction and set its value.

LR Button - (Std. Prog Mixer)

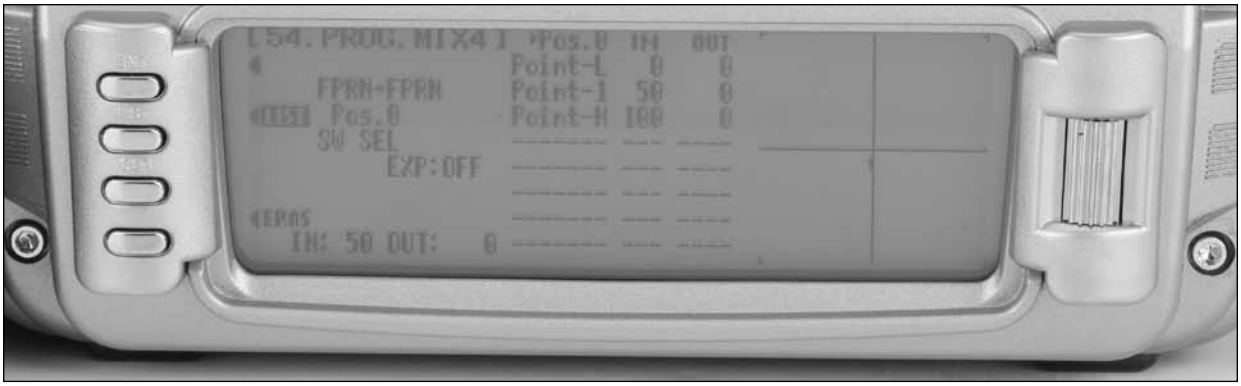
Note: Pressing the CLR button while a modifiable parameter is selected will reset the parameter to its default value. Pressing the CLR button when either the Master or Slave is highlighted inhibits the entire mixer and it is no longer functional.

To Inhibit a Mix

Highlight either the Master or Slave and press the CLR button to completely disable a mixer.

Multi-Point Programmable Mixer

There are 5 Multi-Point Programmable Mixers in the 12x, Prog. Mix4 through Prog.Mix8. They differ from the standard mixes in that they allow non-linear mix response from the Master to the Slave. This is possible because the mixer uses up to 8 points to define the position of the Slave channel relative to the Master channel at up to 8 selectable points. As the Master reaches each point, the Slave response position can be defined independent of other point settings.



Master Channel

The Master channel is the primary channel, lever or trim lever. The Master channel is selected by highlighting and selecting this parameter to obtain a list of channels and then selecting the Master channel from the list.

There are 4 channels that appear more than once. They are Throttle, Aileron, Elevator and Rudder. Since these channels can be influenced by Dual Rate, Exponential, and Throttle Curve settings, they are included in the list twice – once where the D/R and EXP settings are in effect and again where the D/R and EXP settings are ignored. The second time they are listed, there is a special designator to indicate that these channels can also be used as a Master while bypassing any Dual Rate and Exponential settings that may be associated with them. They are designated by a # (pound sign) in front of the name - #FLP, #AIL, #ELE, and #RUD. When one of these channels is selected as the Master, all D/R, EXP and Curve settings associated with the Master are ignored during the mixing operation. Instead, the mixer reads only the physical position of the stick to perform mixing.

A (+) behind the channel indicates a trim include function. By selecting a channel with the (+) the trim lever affects both the master and slave channels.

Slave Channel

This is the Slave channel that will move according to the program mix in relation to the Master channel.

The Slave channel is selected by highlighting and selecting this parameter to obtain a list of channels and then selecting the Slave channel from the list. The list contains each of the 12 channels in the system.

Point Names/Numbers

The points that can be adjusted are listed vertically by name and are also displayed by number along the bottom of the graph.

Change the value of a point by highlighting and selecting the point name and dialing-in the desired percentage.

Current Point Setting

This list shows the setting for each of the 8 adjustable points (Point-L, 1, 2, 3, 4, 5, 6, 7, H). The value of each point determines where the point is positioned vertically on the graph, which dictates the Slave servo position relative to the Master. The point values can be set from -100 to +100. A value of 0 indicates the Slave's center or neutral position. The overall travel of the Slave channel is affected by the Travel settings described in the TRVL ADJ. function.

The value for a point can be changed by highlighting and selecting the Point Name to the left of the point value and then dialing-in the desired value.

Pressing the CLR button when a point value is highlighted resets the point to original settings. The original settings are:

Vertical Line

The Vertical line on the graph shows the current Master channel position. When the Master channel is deflected fully in one direction, the line is to the extreme left over Point-L; when it is at neutral, it is in the center over Point-1; when it is fully deflected in the other direction, the cursor is at the extreme right of the graph over Point-H. Where the Vertical Line intersects the Curve Line over a given point defines Slave servo position, which is equal to the value assigned to that point.

Multi-Point Programmable Mixer

Graph

The graph illustrates the mixing curve. The X-Axis (horizontal plane) represents Master channel movement. The Y-Axis (vertical plane) represents the Slave servo movement, where the bottom 1/2 of the graph is one direction from neutral and the top portion of the graph is the other direction.

Points That Can Be Added and Adjusted

Curve mixes are defaulted to three points (L, 1 and H). Up to five additional points can be added. To add a point, move the Master channel in the desired position until STOR appears on the left bottom of the screen. Pressing STOR will store a new point at that position.

Note: To eliminate a point press ERAS (bottom left of the screen) when the point is highlighted.

Exponential

The Exponential function blends the Curve between the points on the graph to provide a smooth response. The default value is OFF. To turn it on and smooth the mixing curve, highlight and select OFF and it will toggle to ON.

Slave Channel Position

The Slave servo position next to OUT at the bottom left of the display is expressed in values from -100 to +100, with 0 being neutral or center. It represents the servo travel that corresponds to the present Master channel position.

Master Channel Position

The Master channel position is shown on the bottom line of the display next to IN and is expressed in values from 0 to 100 with 50 being the center or neutral position. It represents the present Master channel position.

Switch Select

There are numerous switches that can be used to switch between the Pos0 and Pos1.

> **Note**: If the upper and lower settings for Pos0 or Pos1 are left at 0%, the mixer can be turned On and Off with the switch. In addition, if Flight Modes are activated in the Devic.SEL function, then flight mode switches may be selected. Also Switch positions can be used to select switches between Pos0 and Pos1.

To select a switch that will switch between the Pos0 and Pos1 values, highlight and select the switch name and it will toggle between Pos0 and Pos1.

CLR Button

Pressing the CLR button while a modifiable parameter is selected will reset the parameter to its default value.

> **Note**: Pressing the CLR button when either the Master or Slave is highlighted inhibits the entire mix.

LIST Button

Press the LIST button to return to the FUNCTION List, or rotate the rotary selector until LST appears next to LIST and select it to return to the SYSTEM Menu.

ENT Button

Pressing the ENT button returns to the Main Display.

To Inhibit a Mixer (Turn it off completely)

Highlight either the Master or Slave and press the CLR button to completely disable a mixer.

75: Monitor

The Monitor screen displays each channel and shows the movement of channels when sticks, levers and switches are moved. It renames channels according to special assignments to assist in identifying each channel. For instance, when Flaperon is the wing type, the Monitor will display RAIL for right Aileron and LAIL for left Aileron instead of displaying channel 2 and channel 6. The Monitor function also displays the current value of all digital trims

1. To access the Monitor function, highlight and select MONITOR in the FUNC.LIST to obtain the Monitor display.
2. The default display shows the graphical positions of all channels. To view the digital trim positions for all trims, highlight and select PAGE. View both displays while moving sticks, switches and trim levers to see the movements of various channels and trims.

76: Mix Monitor

The Mix Monitor screen displays all the mixes, dual channels, wing type and snap roll functions. This screen is a convenient way to determine which functions are activated.

1. To access the Mix Monitor screen, highlight and select MIX MON in the FUNC.LIST to obtain the Mix Monitor display.

78: Trainer

The 12X features a programmable Trainer System that allows the instructor to transfer some or all of the primary flight control functions (Throttle, Aileron, Elevator and Rudder) to the student. It also allows for indicating if the transmitter (Tx) is to be the Master (controlled by the instructor) or Slave (controlled by the student). The right or left trim lever is used to transfer control to the student when the 12X is being used as the Master/Instructor transmitter.

All Dual and Expo rates, Gear, and flap positions are controlled by the Master Tx. Only the Throttle, Aileron, Elevator and Rudder channels are transferred to the Slave Tx.

Note: The Slave Tx battery must be charged.

1. Connect the Trainer cord between the Master and Slave transmitters. Turn the power on to the Master transmitter (the Slave Tx remains powered off and can even have the module removed).
2. If the slave radio is a 72MHz system, make sure the Slave Tx is in the PPM/FM modulation mode. If the Slave system is a 2.4 DSM, this does not apply.
3. Highlight and select Trainer in the FUNC.LIST to obtain the Trainer Display.

12X Used as Master (Instructor)

1. If the 12X is being used as the Master Tx (the Tx operated by the instructor), select the channel(s) that are to be operated by the Slave Tx (Tx operated by the student) when the trainer switch is depressed.

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

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

The 12X is now ready to be used as the Master or instructor Tx. Depress the Left trim lever to transfer control to the student. Control will remain transferred until the Left trim lever is released.

12X Used as Slave (Student)

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

The 12X is now ready to be used as the Slave or student Tx.

87: Timer

The 12X features a sophisticated Timer System with three timers. An integrated timer keeps track of total Tx-on time for the current selected model and integrated time is displayed on the Main display. Two other timers can be configured as Countdown timers or as a Stopwatch. These timers also appear on the Main display when active and can be started and stopped via various switches. In addition, an interval function can be programmed such that alarm will sound at preprogrammed intervals. A Down Alarm can be programmed that will sound an alarm prior and up to the programmed countdown time and a one-time function sounds the alarm once or continuously when the time is reached.

1. To configure the timers, highlight and select Timer in the FUNCTION LIST to obtain the Timer display.

Highlight and select INH under TIMER1 or TIMER2 and then select DOWN-T of STOP W. Use the Selector to set the countdown set time, interval, down alarm and one-time functions. Once the timer is set, TIM will appear on the Main display in the lower left corner. The timers can be programmed to several different buttons or switches. Use the Selector to highlight the desired button or switch to operate the timer. Press the Selector to confirm the selection. The desired set time, beep interval, down alarm can be set as desired. When the One-Time function is ON, the timer will start with the switch selected, but pressing the switch again will have no effect. If the One-Time function is OFF, the timer can be stopped, and restarted as many times as desired with the switch selected.

2. To Reset the Integrated Timer, highlight and select the time under INTEG-T and Push [CLR]=0:00 appears on the display. Press the CLR button to the left of the display to reset the integrated timer.
3. To reset the Stop Watch or Countdown Timer, highlight the timer function using the roller on the screen and press CLR.

General Information

FCC Information

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

> **Caution**: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This product contains a radio transmitter with wireless technology which has been tested and found to be compliant with the applicable regulations governing a radio transmitter in the 2.400GHz to 2.4835GHz frequency range.

Daily Flight Checks

1. Check the battery voltage on both the transmitter and the receiver battery packs. Do not fly below 9.0V on the transmitter or below 4.7V on the receiver. To do so can crash your aircraft.

   > **Note**: When you check these batteries, ensure that you have the polarities correct on your expanded scale voltmeter.

2. Check all hardware (linkages, screws, nuts, and bolts) prior to each day's flight. Be sure that binding does not occur and that all parts are properly secured.
3. Ensure that all surfaces are moving in the proper manner.
4. Perform a ground range check before each day's flying session.
5. Prior to starting your aircraft, turn off your transmitter, then turn it back on. Do this each time you start your aircraft. If any critical switches are on without your knowledge, the transmitter alarm will warn you at this time.
6. Check that all trim levers are in the proper location.
7. All servo pigtails and switch harness plugs should be secured in the receiver. Make sure that the switch harness moves freely in both directions.

Servo Precautions

- Do not lubricate servo gears or motors.
- Do not overload retract servos during retracted or extended conditions.Make sure they are able to travel their full deflection. Overloading or stalling a servo can cause excessive current drain.
- Make sure all servos move freely through their rotations and 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 feedback potentiometer in the servo. It may be extremely dangerous to ignore such "buzz" or "flutter."
- Use the supplied rubber grommets and brass servo eyelets when mounting your servos. Do not over-tighten the servo mounting screws, as this negates the dampening effect of the rubber grommets.
- Ensure the servo horn is securely fastened to the servo. Use only the servo arm screws provided; the size is different from other manufacturers.
- Discontinue to use servo arms when they become "yellowed" or discolored. Such servo arms may be brittle and can snap at any time, possibly causing the aircraft to crash.
- Check all related mounting screws and linkages frequently. Aircraft often vibrate, causing linkages and screws to loosen.

General Notes

Radio controlled models are a great source of pleasure. Unfortunately, they can also pose a potential hazard if not operated and maintained properly.

It is imperative to 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 controlled flying, please seek help from an experienced pilot or your local hobby store.

Safety Do's and Don'ts for Pilots

- Ensure that your batteries have been properly charged prior to your initial flight.
- Keep track of the time the system is turned on so you will know how long you can safely operate your system.
- Perform a ground range check prior to the initial flight of the day. See the "Daily Flight Checks Section" for information.
- Check all control surfaces prior to each takeoff.
- Do not fly your model near spectators, parking areas or any other area that could result in injury to people or damage of 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 point the transmitter antenna directly toward the model. The radiation pattern from the tip of the antenna is inherently low.
- 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. Safety can never be taken lightly.

Federal Aviation Administration

Purpose

This advisory outlines safety standards for operations of model aircraft. We encourage voluntary compliance with these standards.

Background

Attention has been drawn to the increase in model aircraft operation. There is a need for added caution when operating free flight and radio controlled craft in order to avoid creating a noise nuisance or a potential hazard to full-scale aircraft and persons and/or property on the surface.

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 and free flight 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.

Information Provided By

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

Warranty Information

Three Year Warranty Period

Exclusive Warranty- Horizon Hobby, Inc., (Horizon) warranties that the Products purchased (the "Product") will be free from defects in materials and workmanship for a period of 3 years from the date of purchase by the Purchaser.

Limited Warranty

(a) This warranty is limited to the original Purchaser ("Purchaser") and is not transferable. REPAIR OR REPLACEMENT AS PROVIDED UNDER THIS WARRANTY IS THE EXCLUSIVE REMEDY OF THE PURCHASER. This warranty covers only those Products purchased from an authorized Horizon dealer. Third party transactions are not covered by this warranty. Proof of purchase is required for warranty claims. Further, Horizon reserves the right to change or modify this warranty without notice and disclaims all other warranties, express or implied.

(b) Limitations- HORIZON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, ABOUT NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF THE PRODUCT. THE PURCHASER ACKNOWLEDGES THAT THEY ALONE HAVE DETERMINED THAT THE PRODUCT WILL SUITABLY MEET THE REQUIREMENTS OF THE PURCHASER'S INTENDED USE.

(c) Purchaser Remedy- Horizon's sole obligation hereunder shall be that Horizon will, at its option, (i) repair or (ii) replace, any Product determined by Horizon to be defective. In the event of a defect, these are the Purchaser's exclusive remedies. Horizon reserves the right to inspect any and all equipment involved in a warranty claim. Repair or replacement decisions are at the sole discretion of Horizon. This warranty does not cover cosmetic damage or damage due to acts of God, accident, misuse, abuse, negligence, commercial use, or modification of or to any part of the Product. This warranty does not cover damage due to improper installation, operation, maintenance, or attempted repair by anyone other than Horizon. Return of any goods by Purchaser must be approved in writing by Horizon before shipment.

Damage Limits

HORIZON SHALL NOT BE LIABLE FOR SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR PRODUCTION OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCT, WHETHER SUCH CLAIM IS BASED IN CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY. Further, in no event shall the liability of Horizon exceed the individual price of the Product on which liability is asserted. As Horizon has no control over use, setup, final assembly, modification or misuse, no liability shall be assumed nor accepted for any resulting damage or injury. By the act of use, setup or assembly, the user accepts all resulting liability.

If you as the Purchaser or user are not prepared to accept the liability associated with the use of this Product, you are advised to return this Product immediately in new and unused condition to the place of purchase.

Law: These Terms are governed by Illinois law (without regard to conflict of law principals).

Safety Precautions

This is a sophisticated hobby Product and not a toy. It must be operated with caution and common sense and requires some basic mechanical ability. Failure to operate this Product in a safe and responsible manner could result in injury or damage to the Product or other property. This Product is not intended for use by children without direct adult supervision. The Product manual contains instructions for safety, operation and maintenance. It is essential to read and follow all the instructions and warnings in the manual, prior to assembly, setup or use, in order to operate correctly and avoid damage or injury.

Questions, Assistance, and Repairs

Your local hobby store and/or place of purchase cannot provide warranty support or repair. Once assembly, setup or use of the Product has been started, you must contact Horizon directly. This will enable Horizon to better answer your questions and service you in the event that you may need any assistance. For questions or assistance, please direct your email to productsupport@horizonhobby.com, or call 877.504.0233 toll free to speak to a service technician.

Inspection or Repairs

If this Product needs to be inspected or repaired, please call for a Return Merchandise Authorization (RMA). Pack the Product securely using a shipping carton. Please note that original boxes may be included, but are not designed to withstand the rigors of shipping without additional protection. Ship via a carrier that provides tracking and insurance for lost or damaged parcels, as **Horizon is not responsible for merchandise until it arrives and is accepted at our facility**. A Service Repair Request is available at www.horizonhobby.com on the "Support" tab. If you do not have internet access, please include a letter with your complete name, street address, email address and phone number where you can be reached during business days, your RMA number, a list of the included items, method of payment for any non-warranty expenses and a brief summary of the problem. Your original sales receipt must also be included for warranty consideration. Be sure your name, address, and RMA number are clearly written on the outside of the shipping carton.

Warranty Inspection and Repairs

To receive warranty service, you must include your original sales receipt verifying the proof-of-purchase date. Provided warranty conditions have been met, your Product will be repaired or replaced free of charge. Repair or replacement decisions are at the sole discretion of Horizon Hobby.

Non-Warranty Repairs

Should your repair not be covered by warranty the repair will be completed and payment will be required without notification or estimate of the expense unless the expense exceeds 50% of the retail purchase cost. By submitting the item for repair you are agreeing to payment of the repair without notification. Repair estimates are available upon request. You must include this request with your repair. Non-warranty repair estimates will be billed a minimum of ½ hour of labor. In addition you will be billed for return freight. Please advise us of your preferred method of payment. Horizon accepts money orders and cashiers checks, as well as Visa, MasterCard, American Express, and Discover cards. If you choose to pay by credit card, please include your credit card number and expiration date. Any repair left unpaid or unclaimed after 90 days will be considered abandoned and will be disposed of accordingly. **Please note: non-warranty repair is only available on electronics and model engines.**

Electronics and engines requiring inspection or repair should be shipped to the following address:

Horizon Service Center
4105 Fieldstone Road
Champaign, Illinois 61822

or

Horizon Hobby UK
Units 1-4, Ployters Road
Staple Tye - Southern Way
Harlow
Essex
CM187NS
United Kingdom

All other Products requiring warranty inspection or repair should be shipped to the following address:

Horizon Product Support
4105 Fieldstone Road
Champaign, Illinois 61822

Please call 877-504-0233 or visit horizonhobby.com to find our distributor for your country for support with any questions or concerns regarding this product or warranty.

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