

10X

USER MANUAL

HELICOPTER
VERSION



JR

Table of Contents

Using This Manual

JR's PCM10X offers the ultimate in programming capability while still retaining the "user friendliness" for which JR's original PCM10, 10S, 10Sx, and 10SxII systems are known. While many of the screens are similar to the previous generation systems, it's important that you read and understand this manual to fully appreciate and take advantage of the capabilities of the features available with the PCM10X.

Your new JR PCM10X is also equipped with JR's new innovative 3+1 Digital Trim System. These new 3+1 Digital Trims offer the best of both worlds—digital trim levers on aileron, elevator, and rudder for maximum efficiency and precision, while retaining the mechanical trim on the throttle for safety and immediate visual reference.

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

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

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1

Features

1.1

Transmitter

- Up to 5 available flight modes are selectable via a programmable switch location. Each flight mode allows the adjustment and selection of nearly every parameter to alter the characteristics of the helicopter for differing flight regimes (e.g., FAI type aerobatics, 3D aerobatics, etc.). Code 17.
- Digital trims on aileron, elevator and rudder feature adjustable trim rates, allowing the increments of each trim step to be adjusted to the desired amount. When adjusting the digital trims, a tone is emitted that signals each trim step. The pitch of the tone changes based on trim position (left trim – high pitch, right trim – low pitch) so that the approximate trim position can be audibly known without having to look at the transmitter.
- Digital trim positions are automatically displayed on the Info screen. A bar graph or a digital value can be selected to display the trim position.
- Digital trim positions are automatically stored in memory and recalled when switching from model to model.
- A mechanical trimmer is included on throttle, offering the ease and convenience of a visual reference during engine startup. The throttle trim rate is adjustable in Code 83.
- A DataSafe™ is included (complete systems only) that allows the 10X to download model memory to any Windows 95® and later PC for infinite model storage and security. See the enclosed Data-Safe manual for instructions.
- A removable 1100mAh Sanyo® battery pack gives nearly 5 hours of continuous use. A built-in charge receptacle allows the battery to be charged separately or in the transmitter.
- Rudder-to-throttle mixing has separate adjustable values left and right and can be activated in any or all flight modes.
- Aileron-to-throttle mixing has separate adjustable values right and left and can be activated in any or all flight modes.
- Elevator-to-throttle mix has separate adjustable values up and down and can be activated in any or all flight modes.
- Gyro gain function, Code 44, allows you to combine rudder to Aux 3 mixes to Code 44 (gyro gain adjustment), allowing stick priority gain control. Stick priority gain values are also displayed on this screen.
- Five programmable tail rotor curves are available that allow up to 7 points to be stored. The mix rate function allows the tail curve to be expanded (1/1, 1/2, 1/4, 1/10) for a more accurate tail adjustment.
- Swashplate mixing features independent aileron-to-elevator and elevator-to-aileron mixing values and can be activated in any or all flight modes. 120° and 140° 3 servo CCPM mixing is also available.
- A servo monitor visually displays each of the ten servo positions. This handy feature is especially useful during the setup of mixes. CODE 75.
- The programming of the PCM10X allows up to five flight modes with independent throttle and pitch curves, tail rotor curve mixing, and pre-programmed Aile/Elev/Rudd-Throttle mixing.
- An exponential function is available on the throttle and pitch curves that automatically “smoothes out” the curve.
- When using the PCM10X in conjunction with a JR Piezo Gyro, three gyro rates are available and can be selected in the six types of flight modes (N, 1, 2, 3, 4, Hold).
- The micro computer system employs an extra large and clearly visible LCD touch display that makes the PCM10X the fastest and easiest radio control transmitter system in the world to program.
- Adjustable stick tension enables you to customize the feel of the gimbals for more precise flying. Refer to Section 3.5 of this manual for instructions on adjusting stick tension.
- The new central processing unit (CPU) in the PCM10X allows for compatibility never before available in any radio system. This transmitter can broadcast in two types of PCM— the new S-series (1024) PCM and the well-known Z-series (512) PCM — as well as PPM. This enables you to use virtually all of your current FM JR receivers.
- The PCM10X is capable of storing ten (10) models in its memory. The ten (10) model memory allows you to completely program ten models into the PCM10X. Or, by using more than one program for a single aircraft, you are able to have different set-ups available.
- The PCM10X is equipped with a five-year lithium battery back-up to prevent memory loss if your transmitter battery pack should discharge completely or if the transmitter battery pack should inadvertently be removed from the transmitter.
- A fail-safe feature when modulating in the S-series PCM allows you to select hold or fail-safe preset positions for the first eight channels individually.
- Direct Servo Control (DSC) permits operation of all controls and servos without generating a radio signal.
- The graphic multi-point pitch and throttle curve means you can set the pitch for 7 selectable stick positions.
- The PCM10X offers a choice of dual rate, exponential or variable trace rate (VTR) movement for the aileron, elevator and rudder channels.
- The PCM10X has eight free programmable mixes, four of which allow the programming of up to a seven point curve that can be turned on/off in any flight mode.

1.2

Receiver

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

1.3

Servos

DS8231 Digital

- The DS8231 features wide spaced dual ball bearings designed to endure the high vibration environments commonly associated with many radio control models.
- A high frequency digital amplifier offers up to 5 times greater holding torque than a conventional servo
- Super-tight deadband of .06 μ s for superior accuracy
- Up to 5 times more holding torque than a conventional servo with less than a 10% increase in current drain
- High output F.E.T. transistor driven motor
- High resolution of 5,900 steps per 120°
- 13 bit A/D converter

1.4

Optional High Performance Tail Rotor Servos

To obtain the highest performance levels from your tail rotor/gyro system, great care and consideration must be taken in the selection of the servo to be used.

In general, the quicker the transit time and the more accurate the centering abilities of the servo, the better the gyro will perform.

If a servo with a slow transit time is used (more than .24 sec/60°), in actuality the gyro system, especially a Piezo unit, may become too quick for the servo, resulting in a “wag” or “hunting” situation which would require the user to reduce the percentage of gain to compensate for this deficiency. This reduction in gain would also reduce the holding power and, therefore, the performance of your gyro system.

The following optional JR servos are recommended specifically for use on the tail rotor:

Standard Servo	Transit Time	Super Servo	Transit Time
JRPS4735	.15 sec/60°	JRPS2700G	.09 sec/60
Digital Servo			
JRPS8417	.10 sec/60°		

1.5

Optional Gyro Selection

The following gyro systems are highly recommended for use with the PCM10X system. Each of these gyros is designed to make full use of the Code 44 gyro sensitivity adjustment feature of this system.

JR NEJ-450 Piezo Gyro (Intermediate/Advanced)

Features

- Integrated design for easy installation/connection
- No moving parts for a nearly unlimited service life
- Linear dynamic range up to 720 degrees per second
- 10 times faster response time than mechanical gyros
- Remote proportional gain control adjustable from the transmitter
- Patented offset drift canceler

Specifications

Operating Voltage:	4.8V
Operating Current:	40 mA
Dimensions/Weight:	1.45"x1.10"x1.42"/1¼ oz.
Gyro Sensor:	40x42x36mm/56g
Remote Gain Controller:	30x22x9mm/8g
Dynamic Range:	0–720° per second

JR's latest Piezo gyro, the NEJ-450, utilizes a new state-of-the-art integrated design for easy installation, while retaining the same performance levels found in the previous JR NEJ-900 Piezo gyro.

Unlike standard mechanical type gyros that use a motor, fly-weights, bearings, etc., the NEJ-450 Piezo gyro system is totally free of moving parts that in time wear out, giving the NEJ-450 a nearly unlimited service life.

The NEJ-450 offers a true linear response of up to 720 degrees per second. The NEJ-450 is also 10 times more sensitive and has a faster response time than any current mechanical type gyro, making it one of the highest performance gyros available.

JR NEJ-3000 Piezo Gyro (Advanced/Expert)

Features

- M.P.C. (Multi Pulse Control) System—The high frequency output pulse of the NEJ-3000 is three times faster than existing electronic gyros for unmatched performance.
- Over-travel limiters prevent servo over-stroke.
- A built-in remote gain controller allows gain adjustment from the transmitter.
- Newly developed offset drift canceling circuitry.
- Solid state design with no moving parts for an almost infinite lifetime.
- Linear dynamic range up to 720 degrees per second.

Specifications

Operating Voltage:	4.8
Operating Current:	50 mA (gyro only)
Dimensions:	
Gyro Sensor:	33 x 33 x 35mm
Amplifier:	38 x 18 x 53mm
Weight:	
Gyro Sensor:	1.3 oz
Amplifier:	1.1 oz

JR's NEJ-3000 Piezo Electronic Gyro System represents the latest in technological advancements. The NEJ-3000, combined with JR's 2700G Super Servo, offers superior "holding power" in all conditions, unequaled by any other gyro system. Its advanced M.P.C. (Multi Pulse Control) System has a high frequency output that allows the NEJ-3000 to react up to three times faster than existing electronic gyros.

Important: JR's NEJ-3000 must be used in conjunction with JR's 2700G Super Servo. JR's 2700G Super Servo features an ultra quick response and transit time, and its total servo stroke (throw) is specifically matched to give the best possible resolution when used with the NEJ-3000 Piezo Gyro. The 2700G Super Servo features a metal gear train—standard plastic gears can strip because of quick changes in servo direction/velocity when hooked to the NEJ-3000 Gyro.

2

Component Specification

2.1 System Specifications

System Name J120HS Computer Helicopter System
 Transmitter (Main Body) . . NET-J120HS
 (RF Module) NET-J72P, NET-J50P, NET-J53P
 Receiver NET-950S
 Servos DS-8231 Digital
 Charger NEC-222
 Airborne Battery 1400 mAh Sanyo Extra[®] NiCad

2.2 Transmitter Specifications

Model No. NET-J120HS
 Encoder 10 Channel Computer System
 RF Module 50/53/72 MHz
 Modulation PCM (S&Z) or PPM
 Output Power Approximately 750 mw
 Current Drain 200 mA (70 mA w/DSC)
 Power Source 1.2V x 8 NiCad (9.6V) 1100mAh
 Output Pulse (in microseconds) . . . 1000-2000 (1500 neutral)

2.3 Servo Specifications

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

2.4 Receiver Specifications

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

2.5 Charger Specifications

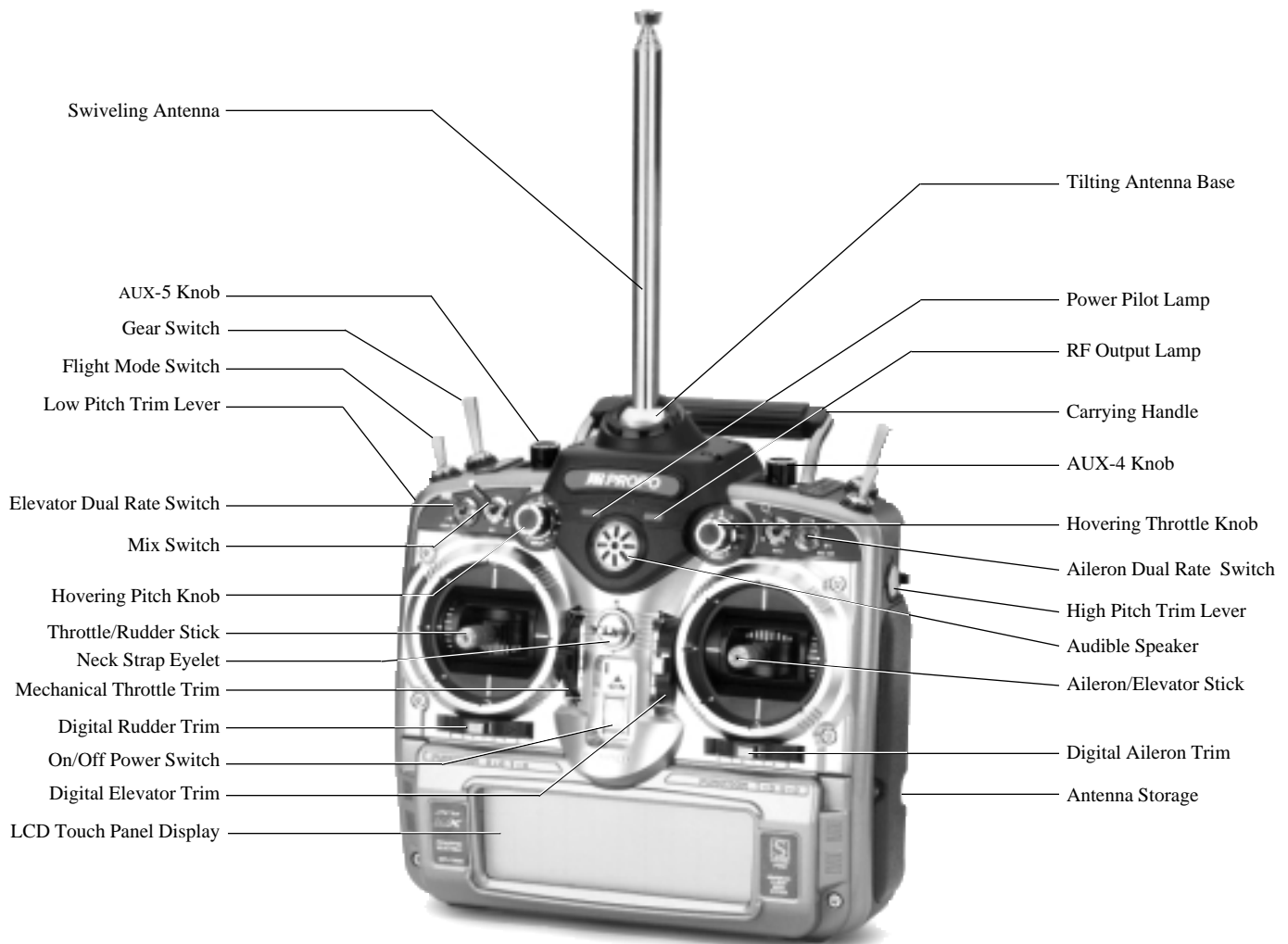
Model Number NEC-222
 Input Voltage AC100-120v
 Output Current 50mAh Tx/120mAh Rx
 Charging Time 15 hours

2.6 Airborne Battery Packs

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

3

Transmitter Controls



3.1

Control Identification

Antenna

- The adjustable base can be locked into position by tightening the two screws just to the rear of the antenna ball mount. Do not over-tighten. This feature allows you to determine the antenna angle that suits you best and to lock it in place.
- The antenna can be removed and stored in the special compartment in the right side panel of the transmitter. The next time you fly, simply thread the antenna into the ball mount. It will automatically assume the previously set angle.

Note: Do not point your antenna directly at your model helicopter. The tip of the antenna is the weakest radio frequency radiator in any radio controlled transmitter. Instead, have the antenna at about a 20°–45° angle away from the model.

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

Base Loaded Active Antenna

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

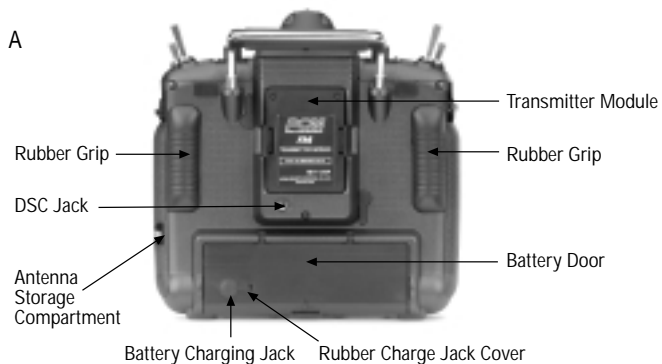
Channel Assignment

- | | |
|----------|---|
| 1. THRO | Throttle Channel |
| 2. AILE | Aileron Channel |
| 3. ELEV | Elevator Channel |
| 4. RUDD | Rudder Channel |
| 5. GEAR | Gear Channel |
| 6. AUX1 | Auxiliary 1 (used for pitch w/collective pitch helis) |
| 7. AUX2 | Auxiliary 2 Channel |
| 8. AUX3 | Auxiliary 3 Channel or Code 44 Gyro Gain (if active) |
| 9. AUX4 | Auxiliary 4 Channel |
| 10. AUX5 | Auxiliary 5 Channel |
| 11. BATT | Receiver Battery Pack Port |

Throttle ALT

This function makes the throttle stick trim active only when the throttle stick is less than half throttle. This gives easy, accurate idle adjustments without affecting the high throttle position. In hovering flight, this feature will function as a simple high idle system.

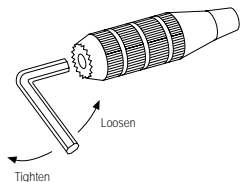
3.2 Transmitter Rear



3.3 Stick Length Adjustment

Control Stick Length Adjustment

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



To adjust the stick length, use the 2mm Allen wrench (supplied with your PCM10X transmitter) to unlock the set screw.

Note: Turn the wrench counter clockwise to loosen the screw and clockwise to tighten it.

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

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

If you desire longer sticks, JR has developed a new, thicker stick (JRPA047) which is approximately one inch longer than the standard sticks. This stick, crafted from bar stock aluminum, is available at your local JR dealer.

3.4 Neck Strap Attachment

An eyelet is provided on the face of the PCM10X transmitter which enables you to connect a neck strap (JRPA023). This hook has been positioned so that your transmitter will have the best possible balance when you use a neck strap.

Cautionary Note: Please double check to ensure that the neck strap is securely fastened to the transmitter.

3.5 Adjustment of Stick Tension

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



1. Carefully remove the rear rubber grips. Do this by gently prying the grip by hand from the case.

2. Carefully remove the lower right-hand rubber plug. (The upper left rubber plug is used for adjusting Mode 1 transmitters only.)

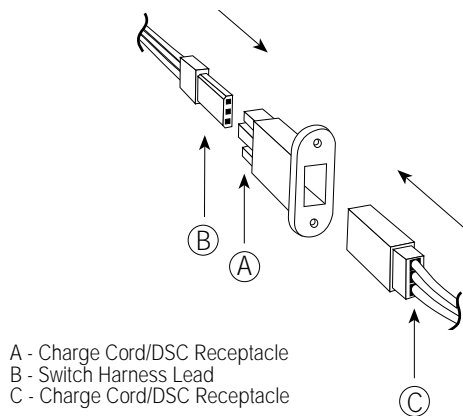
3. Using a small Phillips screwdriver, rotate each adjusting screw clockwise to tighten its respective stick tension (counterclockwise to loosen).

After achieving the desired stick tension, carefully replace the rubber grips and plugs.

Direct Servo Control (DSC)

For proper DSC hook-up and operation:

1. Leave the transmitter power switch in the “off” position. The transmitter will not transmit any radio frequency (RF) in this position.
2. Plug the DSC cord (supplied) into the DSC port in the rear of the transmitter.
3. The encoder section of the transmitter will now be operational and the LCD display will be lit.
4. Plug the other end of the DSC cord into the receiver charge receptacle. Turn the switch harness to the “on” position.



Note: When installing the switch harness charging jack, be sure to hook the charging jack receptacle, **JRPA024**, securely into the switch harness charge cord.

Why you should use the DSC function:

1. The DSC enables you to check the control surfaces of your helicopter without drawing the fully operational 200ma from your transmitter battery pack. Instead, you will only draw 70ma when using the DSC function.
2. The DSC function allows you to make final adjustments to your helicopter without transmitting any radio signals. Therefore, if another pilot is flying on your frequency, you can still adjust your helicopter and not interfere with the other pilot's aircraft.

Note: Under no circumstances should you attempt to fly your helicopter with the DSC cord plugged in! This feature is for bench checking your helicopter only.

Frequency Notes

The PCM10X employs a plug-in module system for transmitter frequency changes. If you wish to change a frequency, you can simply change the radio frequency (RF) module, commonly referred to as either an RF module or transmitter module. The JR modules are universal for all of the modular frequency controlled systems. In other words, if you currently own a modular JR system, you can use the RF module from your current system with the new PCM10X.

The PCM10X can transmit in either pulse code modulation (PCM) or in pulse position modulation (PPM). Be certain to observe the following guidelines:

1. Do not operate your transmitter when another transmitter is using the same frequency, regardless of whether the second transmitter is PCM, PPM, AM or FM. You can never operate two transmitters on the same frequency simultaneously without causing interference to both receivers and crashing both aircraft.
2. For operation of your PCM10X with additional receivers, you should refer to the receiver compatibility chart. The chart is located in Section 8.25 of this manual.

Aircraft Only Frequencies

JR RF modules and receivers are available in 50, 53 and 72 MHz frequencies in the United States for use with model aircraft. Employing 72 MHz frequencies does not require a special operator's license from the Federal Communications Commission (FCC). However, the 50 and 53 MHz frequencies require that you carry a Technician no code II license.

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

4

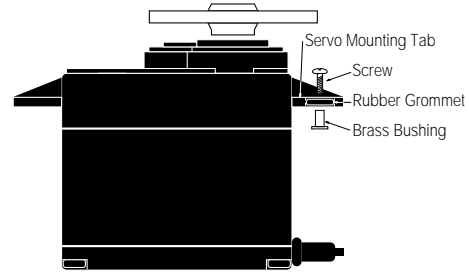
Connections

4.1

Installation Requirements

It is extremely important that your radio system be correctly installed in your model. Here are a few suggestions on the installation of your JR equipment:

1. Wrap the receiver in protective foam rubber that is no less than 3/8 inch thick. Secure the foam to the receiver with #64 rubber bands. This will protect the receiver in a crash or a very hard landing.
2. The servos should be mounted using rubber grommets and brass bushings to isolate them from vibrations. Do not over-tighten the mounting screws — this will negate the vibration absorption effect of the rubber grommets. The diagram at right will assist you in properly mounting your servo.

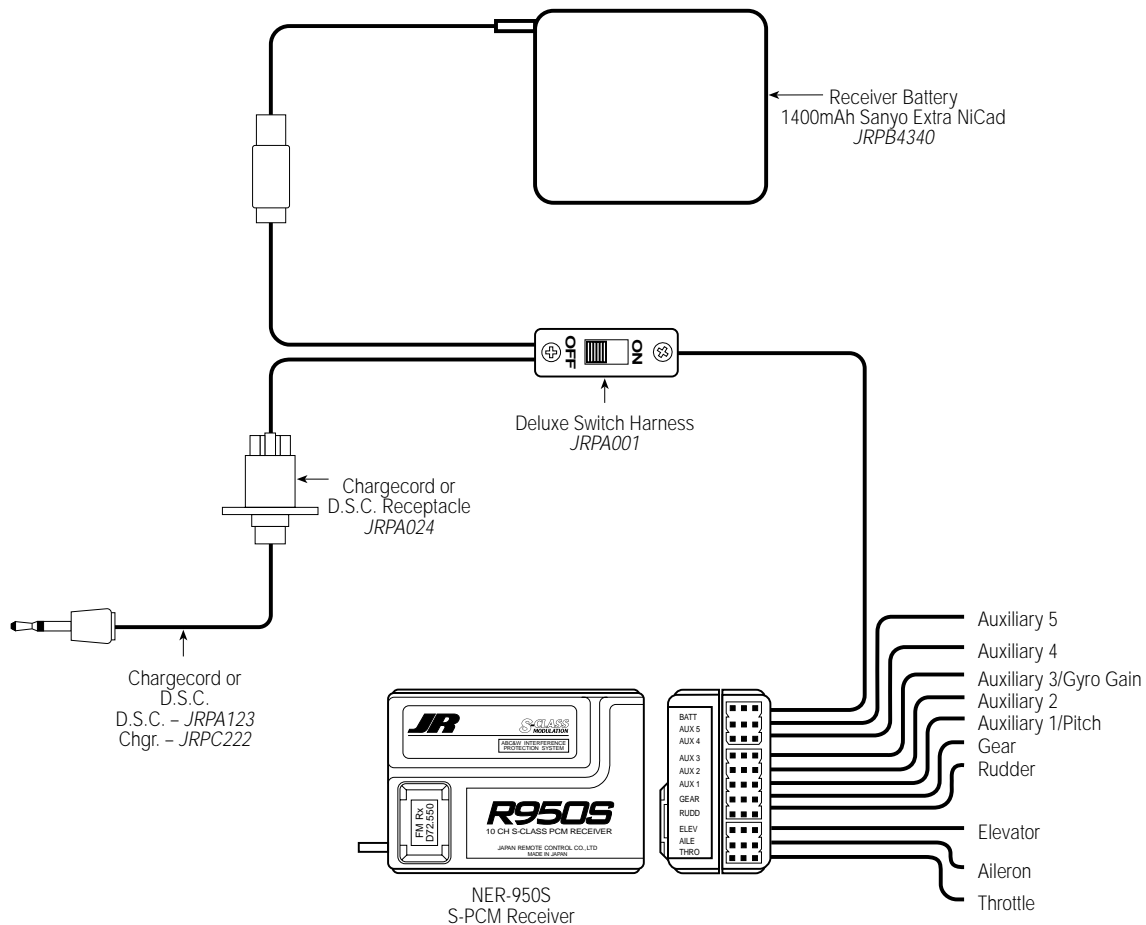


The brass bushings are pushed from the bottom up in the rubber grommets. When the servo screw is tightened securely, this will provide the proper security as well as the proper vibration isolation for your servo.

3. The servos 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.
4. 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.
5. Mount the receiver antenna firmly to the helicopter to ensure that it will not become entangled in the main and/or tail rotor blades of your helicopter.

4.2

Connections



5

Display and Touch Panel

5.1

Care of the Touch Screen

Avoid dust, moisture and extreme temperature changes.

Do not press on the display panel with sharp objects such as ball point pens.

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

The intensity of the screen will change with extreme temperature changes. This is normal and does not indicate a malfunction of your PCM10X. The screen will return to normal once the temperature has stabilized.

5.2

Operating the Touch Panel

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

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

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

Note: The PCM10X has a new two-speed scroll function. By depressing the + or - key one touch at a time, you can make minute changes to the LCD display values. However, by keeping your finger on the + or - keys, the values will begin to change quite rapidly.

When + CL - is displayed on the LCD display, press the + and - keys simultaneously or the CL. The respective function value will clear back to the factory preset or default position.

Setting Percentage Display and Key Input

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

6

Alarm and Error Display

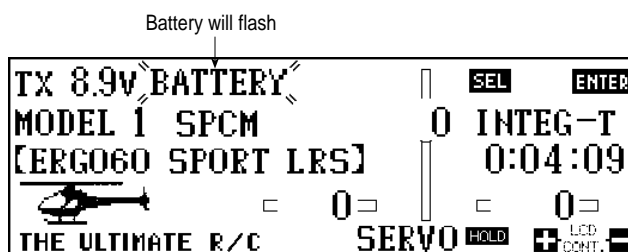
6.1

Battery Alarm

When the transmitter voltage drops below 9.0 volts DC, the display will flash the word BATTERY and an audible alarm will sound. The audible alarm will sound 4 times consecutively, pause for a moment, then sound again, for a total of 24 times.

Notes pertaining to the battery alarm:

1. BATTERY will only flash if you are in the initial display screen. If you are in any other screen, you will only hear the beeping of the alarm. If you are flying when you hear this alarm, you should land immediately.



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

6.2

Back Up Error Alarm

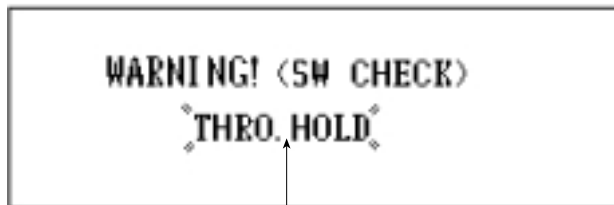
A five year lithium battery protects all pre-programmed data against main transmitter battery failure. The lithium battery also allows the 10X to retain all pre-programmed data in the event the transmitter battery pack is removed from the transmitter. Should the lithium battery fail, the display will indicate BACK UP ERR. and an audible alarm will sound. If this occurs, you will have to have the lithium battery replaced. All transmitter programs will return to the factory default settings, and the data you have entered will be lost and have to be re-programmed. When it becomes necessary to replace the lithium back-up battery, please contact Horizon Service Center. Improper removal or replacement can cause extensive damage, and only the Horizon Service Center is authorized to make this battery change.

Note: If you are flying when the lithium back-up battery fails, you will not lose control of your aircraft. However, when the transmitter power is turned off, all the programmed data will be lost. It is for this reason that we urge you to record all input data on the data sheet provided at the back of this manual.

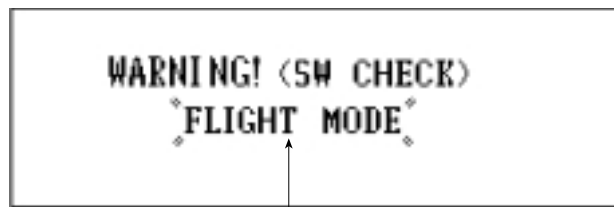
6.3

Switch Position Warning Message

If any switches are on that could be dangerous (e.g., Throttle Hold, Flight Mode-Stunt modes 1-4) when you first power up your transmitter, an audible alarm will sound. The display shows you which switches are out of position by flashing the name of the activated switch as shown below.



Flashing



Flashing

When the switches have been returned to their normal or “off” position, the screen changes to the standard display, and the audible alarm will cease to sound.

As a precautionary measure, we recommend that prior to starting your model you turn your radio “off” and then return it to the “on” position. If any of the critical switches are on without your knowledge, the transmitter will tell you.

6.4

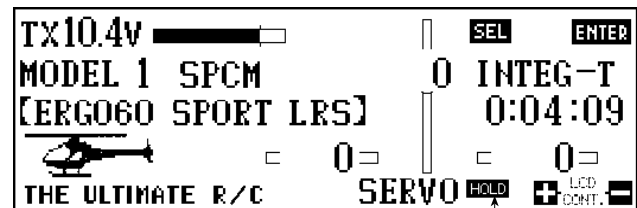
All Servo Hold Function: Main Screen

Your new PCM10X system is equipped with the new All Servo Hold function, located to the lower right side of the main screen.

This feature allows you to “hold” the movement of all servos so that the flight mode switch can be utilized to display trim values for each of the flight modes, all while your heli’s engine is still running.

This feature is very helpful because it allows the user to view the individual flight mode trim values on the main screen without having to turn off the helicopter’s engine.

The All Servo Hold function also has a special safety feature that will not allow the servos to be re-activated until the throttle stick is at the low position and the flight mode switch is in the low position. A warning will be displayed on the main screen instructing you to move the throttle stick and flight mode switch to the correct positions (FM Normal and Low Throttle).



Touch **HOLD** to stop all servo movement

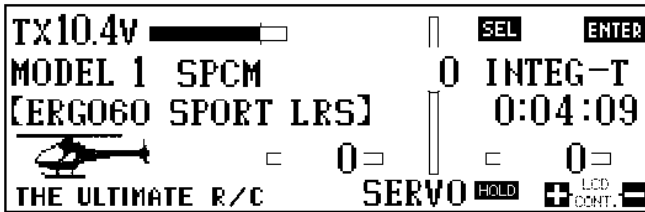
7

Data Input

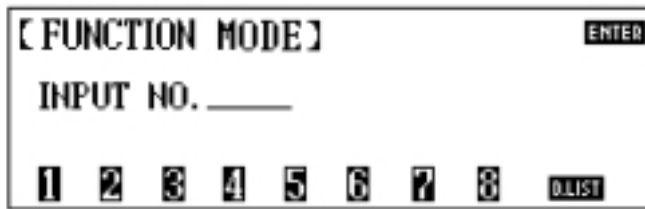
There are two methods you can use to enter data in your PCM10X transmitter — code number access and direct mode method. Both methods work equally well, although the direct mode method may be easier to use until you become familiar with the code numbers on the PCM10X.

Turn the PCM10X power switch to the “on” position.

The initial LCD screen will appear as follows:



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



7.1

Code Number Access

From this screen, you can input data with either method — code number access or direct mode method.

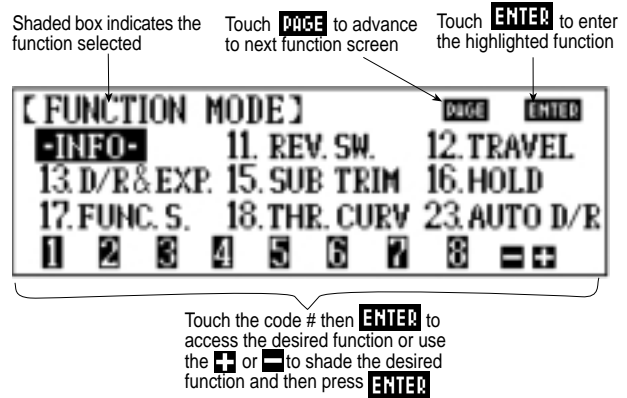
From the second screen, press the code number of the function you want to access. For example, if you desire to set the servo reversing switches, look up the corresponding code number on the chart located in Section 8 of this manual, in this case Code 11. Press 11 and the LCD display will show Reverse SW. Next, press enter and the display will change to show the reverse function.

After you have completed all of your set-ups for the desired code number, press enter and the screen will return to the function mode screen. Press ENTER again to return to the initial display screen.

7.2

Direct Mode

If at screen 2 you are unsure of which code number to enter at this time, simply push the D.LIST key. This calls up the first nine (9) functions (numerically) on the LCD display. This screen will display:



If the code you want to access appears on this screen, push the + key until the shaded box (now highlighting the INFO function) highlights the chosen function. Next, press the ENTER key to enter the function. After making the necessary adjustments, press the ENTER key once again. This will bring you back to screen number 2. If at this point you touch the D.LIST key, the shaded box will return to the position you were at just prior to entering the desired code.

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

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

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

8

Code Function

At the beginning of each code function in this manual, there is a brief explanation of the code and its significance to your helicopter. It's important that you comprehend each code completely prior to moving on to the next code.

Code #	Display	Program Description
11	Reverse SW	Servo reversing switches—all channels
12	Travel adjust	Endpoint-travel adj.—all channels
13	D/R & EXP	Dual Rate & Exponential adjustment—Elev./Aileron/Rudder
15	Sub-Trim	Electronic means of centering all channels
16	Throttle Hold	Throttle hold position adjustments and throttle hold delay settings
17	Function Select	Selection of flight modes 3 and 4, gear, Aux 2, low pitch, and high pitch switches and levers, as well as Digital Trim inhibit function
18	Throttle Curve	Throttle curve settings
23	Auto Dual Rate	Automatic dual rate selection and adjustments
28	Data Reset	Individual program erasure and reset
41	Rudder → Throt Mix	Adjusts throttle when rudder is applied
42	Aileron → Throt Mix	Adjusts throttle when aileron is applied
43	Elevator → Throt Mix	Adjusts throttle when elevator is applied
44	Gyro Sens Adj.	Gyro sensitivity adjustments; three available rates
47	Tail Curve	Revolution mixing selection and adjustment with multi-point tail curves for stunt modes 1–4
51-54	Standard Prog. Mix	Program mixing selection and adjustments
55-58	Multi-Point Prog. Mix	Up to 6 point programmable curve
65	Swash Mixing/Type	Swashplate mixing selection and adjustments; independent swashplate timing adjustments available for both aileron and elevator. CCPM mixing 120° and 140° 3 servo is also available
68	Pitch Curve	Pitch curve selection and adjustments
75	Servo Monitor	Servo monitor gives visual indication of all servo positions plus Servo Test—Slow & Step
77	Fail-Safe	Fail-safe memory & settings
81	Model Name	Model name memory input
82	Trim Offset	Trim offset correction adjustments
83	Trim Rate	Trim travel authority selection & adjustments from 100–0% in 1% increments
84	Model Select/Copy	Model Memory selections (1–10), Copy Function

85	Modulation	Modulation Selection (SPCM, ZPCM, PPM)
86	Data Transfer	Model memory transfer to/from another PCM10X or DataSafe
87	Timer	Countdown timer & Tx on time reset
88	Keyboard Lock	Keyboard lock password selection

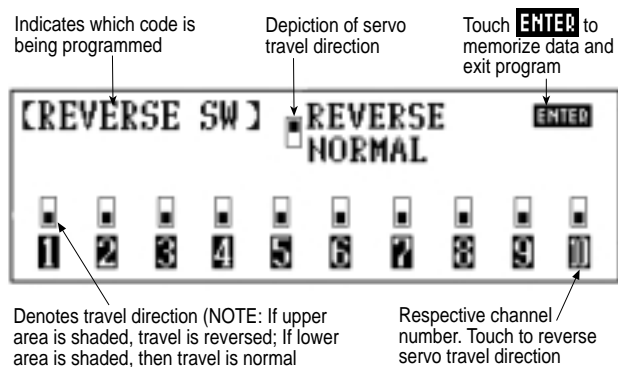
Reversing Switches

This is an electronic means of reversing the throw of a given (servo) channel. All ten (10) channels of the PCM10X offer reversible servo direction. This will ease setup during the servo installation into your helicopter.

Accessing and Utilizing the Servo Reversing Feature

Prior to accessing the servo reversing feature, determine which servos' travel needs to be reversed. To do so, move the controls of your PCM10X and observe the travel direction of each servo. If the respective servo is not moving properly, i.e., not in accordance with the control input, then reverse its direction.

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



The screen will appear as follows:

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

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

Note: All servo directions are set to their normal throw at the factory and are set at the default positions (Code 28 or clear).

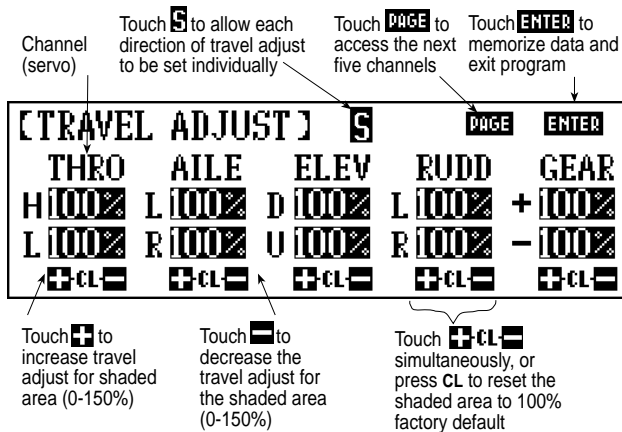
Travel Adjust/ATV/End Point Adjust

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

Accessing and Utilizing the Travel Adjust/ATV Feature

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

The screen will appear as follows:



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

Note: In this mode the shaded box follows the directional movement of the control. It is this value you will be adjusting.

Press the + key to increase the amount of servo travel and the - key to shorten the amount of servo throw. If you want to reset the travel throw to the factory default, 100%, you can either press the + and - keys simultaneously or press the CL key.

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

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

Dual Rate/Exponential Adjustments

Up to five programmable rates, each with their own exponential values, are offered on the aileron, elevator and rudder channels when flight modes are activated. (Three rates are available for aileron elevator and rudder in normal mode.) In addition, rate and expo values are independently adjustable in each direction, allowing you to perfectly tailor the response and feel of your helicopter. We've found this especially beneficial for aerobatics as the dual rate and expo values to achieve the same response/feel with up and down elevator can be quite different.

Dual rates offer the ability to adjust the travel of the primary control surfaces (aileron, elevator, rudder) via a switch, thus altering the aircraft's response rate so specific maneuvers can be achieved. Aggressive maneuvers like 3D aerobatics require large control throws, while slow rolls, rolling circles, etc., require much smaller control throws to avoid over-sensitivity. Dual rates allow you to change your aircraft's response in flight.

Exponential does not affect the overall travel (end points) of the channel/servo. Exponential affects the rate at which the servo moves in intermediate positions (less than full travel) and is typically used to desensitize the neutral area such that minor corrections can be input easily to level the helicopter. When exponential is not used, the servo response rate is linear. That is, for every incremental step the control stick moves, the servo also moves in the same increments. If the stick moves 10%, the servo moves 10%.

When Exponential is activated, a positive (+) Expo value causes the servo to move less than the stick when the stick is near the neutral position. For example, the stick may be moved 20% while the servo moves 10%. As the stick is moved further from center, the servo movement is increased, and at the extremes of travel, the % of servo travel is actually higher than the stick travel. The larger the (+) Expo value selected, the less sensitivity (reduced servo movement) will occur around neutral, but a greater sensitivity will occur at the extremes of travel.

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

very smooth, precise control while using relatively large movements with the control sticks. If you'd like to try Expo for the first time, a value of +20% is a good place to start. This will give you the feel that Expo offers, but won't be so different than what you've been flying.

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

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

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

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

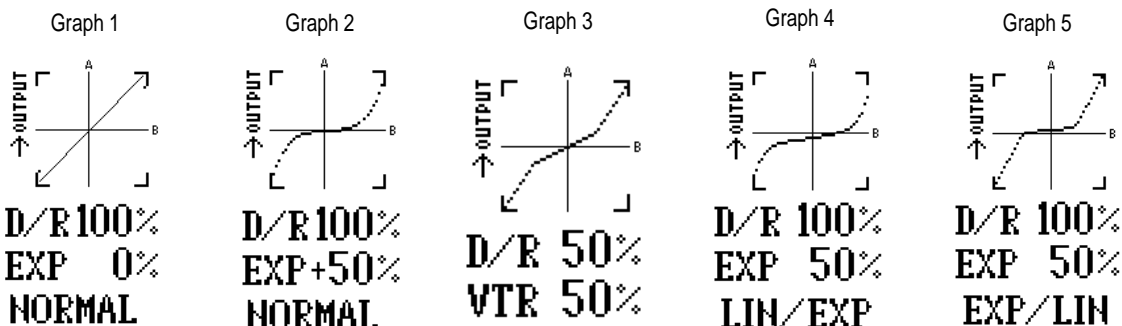
Graph 2 represents the normal stick control with the introduction of positive exponential. The response or rate of servo travel is less at the neutral point and increases as the stick reaches its travel limits. This type of exponential rate is useful if the controls are very sensitive around the neutral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

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

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

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

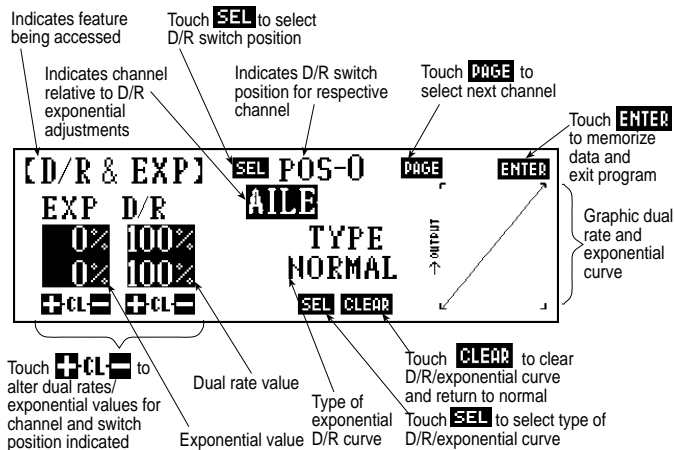
Graph 5 represents an Expo Linear curve. However, travel rates are exponential around center and then switch to linear after 50% of stick travel.



Accessing and Utilizing the Dual Rate/Exponential Feature

To access the Dual Rate and Exponential features, enter Code 13 in the code number access selection or use the direct mode method.

Your screen will appear as follows:



Note: Although dual rates and exponential operate in conjunction with one another, we will cover them separately.

Dual Rates

The adjustable range for each of the dual rate positions is 0-100%.

In normal flight mode, the dual rates used are dependent on the 0 and 1 switch position for each of the applicable channels. When the stunt modes and the throttle hold switches are activated, the rates are controlled by the auto dual rate function, Code 23, located in Section 8.8 of this manual.

First, touch the PAGE key to call up the desired channel (aileron, elevator, or rudder) for which you want to adjust the rate.

Select the switch position for which you want to adjust the rate. Keep in mind that 0 and 1 pertain to the D/R switches when in the normal flight mode, while the 2 position may be called up on the auto dual rate feature.

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

Note: It is not possible to increase the throw rate from the factory default settings. You may observe the servo changes by moving the respective stick while increasing or decreasing the values. The control changes accordingly. To clear the dual rate, touch the CL key, or the + and - keys simultaneously.

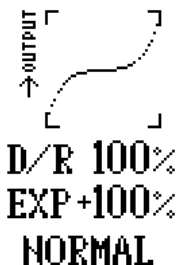
After the rates have been dialed in to your satisfaction, begin to adjust the exponential values. Remember that the exponential values do not change the rates. They only alter the way in which this travel is reached.

Adjustment of the Exponential Curves

The adjustable range of the exponential curve is $\pm 100\%$ for each of the positions and the respective channels.

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

The following graphs may aid in understanding the exponential curve.



The response or rate of servo travel is less at the neutral point and increases as the stick reaches its travel limits. This type of exponential rate is useful if the controls are very sensitive around the neutral point.



The response rate of this servo is more around neutral and decreases as the stick reaches its travel limits. This type of exponential rate is useful if the control is very slow or unresponsive around the neutral point.

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

VTR: Variable Trace Rate

This feature may be thought of as a double dual rate. The adjustable range of VTR is from 50-90% in 10% increments.

When VTR is active, the servo response remains linear over the first portion of the dual rate curve and then switches to the higher rate at the point you have selected.

To select among the VTR rates, touch the SEL on the lower portion of the LCD screen.

As you can see in the graphs at the bottom of the page, over the first portion of travel the servo response rate is linear, but at the variable trace rate, it switches to the higher rate of travel.

You also have the choice of either an exponential/linear curve or linear/exponential. These curves appear as follows:



Up to 50% stick travel around center at the linear rate, it then switches to exponential. In other words, it operates both ways, linear over the first portion of the curve and with an exponential rate over the last portion.



Up to 50% stick travel around center at the exponential rate, it then switches to the linear rates. In other words, it operates both ways: exponentially over the first portion of the curve and with a linear rate over the last portion.

same response and feel in both directions. It's typical for an aerobatic aircraft to require slightly more down dual rate and less Expo value to achieve the same feel for up and down elevator.

To independently adjust the dual rate or Expo value for each direction, simply move the appropriate stick in the desired direction, and the shaded box will highlight only the selected direction. Now adjustments can be made to that direction only.

Summary of Exponential Curve Selections

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

Set Up Tip

Exponential

Many fliers have found that using exponential on fore/aft and right/left cyclic allows them to input more precisely minor corrections during hovering, while still allowing adequate control throw at the end of the stick travel. We recommend +15% expo on ailerons and elevator as a good starting point.

Adjusting Dual Rates and Expo Value Independently in Each Direction

The 10X allows dual rates and/or Expo values to be independently adjusted in each direction of servo travel. This is extremely useful in that many aircraft have differing pitch, roll or yaw rates in each direction, and a different value is needed to achieve the

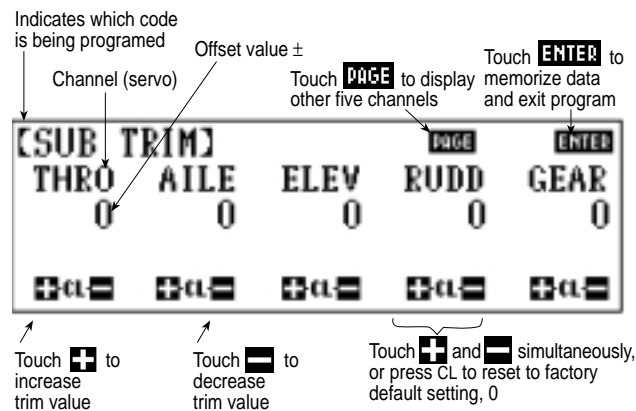
Sub-Trim Adjustment

The sub-trim adjustment is a feature that allows you to electronically fine-tune the centering of your servos. Individually adjustable for all ten (10) channels with a range of +/-250% in increments of 2% (+/-30° servo travel), the sub-trims can be set for the same neutral settings for each model stored in the transmitter's memory. This allows the same mechanical trim tab settings between all of the models you control with the same transmitter. You don't have to make the precise mechanical adjustments to your aircraft to achieve these results, as you would normally have to do with a standard transmitter.

Accessing and Utilizing the Sub-Trim Adjustments

To access the sub-trim adjustments, enter Code 15 in the code number access selection or use the direct mode method.

The screen will appear as follows:



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

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

For corrections in trim offsets of aileron, elevator, and rudder channels, refer to Code 82, trim offset adjustment.

Press the + key to increase the amount of offset or press the - key to decrease (actually increase) the amount of opposite offset. To reset the sub-trims to the factory default, 0, press the + and - keys simultaneously or press the CL key.

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

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

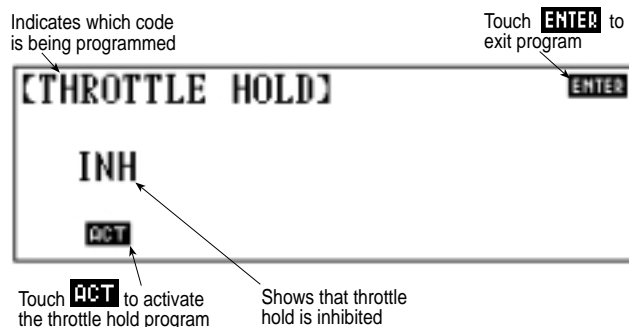
Note: On previous generation of JR's 10-channel computer radios, the sub-trim adjustment values are adjustable from 0 to 125% in 1% increments. Your 10X is adjustable in 2% increments up to 250%. If you're transferring over sub-trim values from a previous generation JR 10-channel radio to the 10X, the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

Throttle Hold

The Throttle Hold function (when activated) allows you to retain control of the collective servo, yet leave the throttle servo at a pre-determined position. This feature is particularly useful for autorotations. It switches the throttle servo to a preset position and disconnects it from the control stick, but leaves the collective pitch control with the stick position.

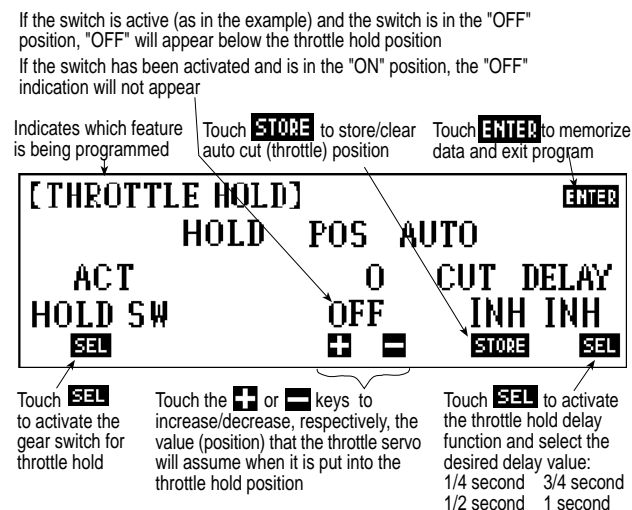
Accessing and Utilizing the Throttle Hold Function

To access the Throttle Hold function, enter Code 16 in the code number access selection or use the direct mode method. The screen will appear as follows:



Touch the ACT key to activate the throttle hold feature.

The screen will now appear as follows:



If the switch is active (as in the example) and the switch is in the "off" position, "off" will appear below the throttle hold position. If the switch has been activated and is in the "on" position, the "off" indication will not appear.

If the program is returned to the inhibited selection, the values are retained (for the hold position and automatic throttle cut options) for the next time Throttle Hold, Code 16, is accessed within the same model.

Touch the + or - keys to increase/decrease, respectively, the value (position) that the throttle servo will assume when it is put into the throttle hold position.

Hold Position

The adjustable value for the throttle hold position is between 0 to 100 and is pro-rated to the throttle curve value.

The value (position) you program for the hold position is the position which your throttle servo assumes when the Hold function is activated.

The word "off" may appear below the hold position value if the throttle hold switch is in the "off" position or if the throttle stick has not been reduced below the automatic cut position.

Note: The high and low pitch trim levers, if activated in Code 17, Function Select, still affect the high and low pitch curve, even if the Throttle Hold function is activated.

Auto Cut Setting

The auto cut setting may be easier to think of as an automatic throttle cut-off point, since this is the function it performs. This feature allows you to select whatever throttle stick position activates the Throttle Hold function. Although the throttle hold switch may be active, the throttle servo itself also remains active, i.e., following the throttle stick movement, until you reach the auto cut position that you are about to select.

Selecting the Auto Cut Position

This process is a very simple one. Place the throttle stick to the position for which you desire the throttle hold to become active and touch the key located below the auto cut. The display now exhibits the value of the stick position that you have selected. This value will be between 0–100%

If you want to change the auto cut point after you have already selected one, touch the CL key below the auto cut. This inhibits the previous position. Next, move the throttle stick to the desired location and press the STORE key. The new value will be displayed at this time.

Most model helicopter pilots select a point very near the lowest throttle stick position for their auto cut position.

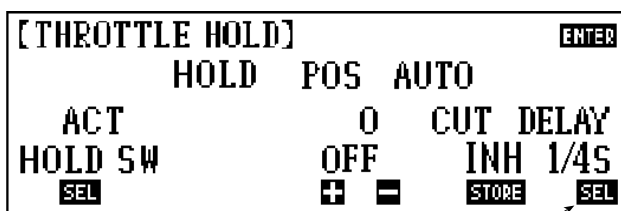
Note: If you opt not to select a point for the auto cut to engage, the throttle servo immediately assumes its hold position once the throttle hold switch is activated.

Throttle Hold Delay

The Throttle Hold Delay function is a new addition to the PCM10X software. This feature functions as a way to delay or “Slow” the throttle servo’s movement when switching from throttle hold back to the previous flight mode.

This feature is very helpful when practicing autorotations as it allows the autorotation to be aborted if necessary, without the usual harsh return to full power. In conventional systems, when an autorotation is aborted, the engine immediately returns to an extremely high throttle position as indicated by the previous flight mode. This situation causes a very high load to be applied to the main gear and drive train of the helicopter due to the engine’s immediate return to power, and in some cases it can damage the main drive gear, or other components of the helicopter. This sudden return to power can also cause the helicopter to rotate violently due to the immediate return of torque, which can startle the pilot at the very least.

The Throttle Hold Delay function eliminates all of the previously mentioned problems by bringing the engine back to full power smoothly. This feature can be custom tailored to the individual pilot’s requirements and is adjustable in increments of 1/4 second, 1/2 second, 3/4 second, and 1 second delay times.



Press **SEL** to select the desired Throttle Hold Delay value:
1/4 second, 1/2 second, 3/4 second, 1 second

Set Up Tip

Establishing Your Throttle Hold Delay Value

For initial testing of the Throttle Hold Delay function in flight, it is suggested that you start at the 1/4 second setting for the first flight so you can develop the feel for this function. Increase the delay time as needed until the desired delay time is achieved.

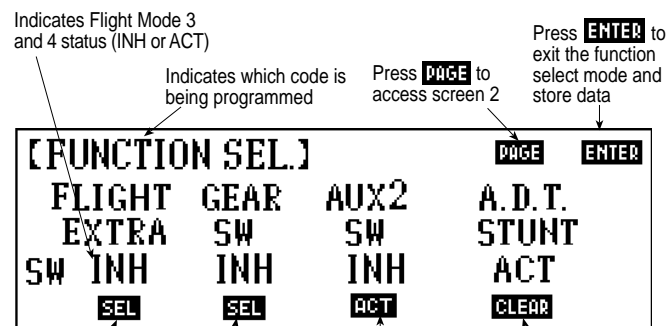
Function Select

Function Select allows you to activate/inhibit flight modes 3 and 4 and assign the switch position, to assign the function of the gear switch (hold, gear, inhibit), to activate the function of the Aux2 switch and to activate/inhibit the low and high pitch trim levers. This function also allows the user to inhibit the Digital Trim function in Stunt Modes 1–4 if desired.

Accessing and Utilizing the Function Select Function

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

The screen will appear as follows:

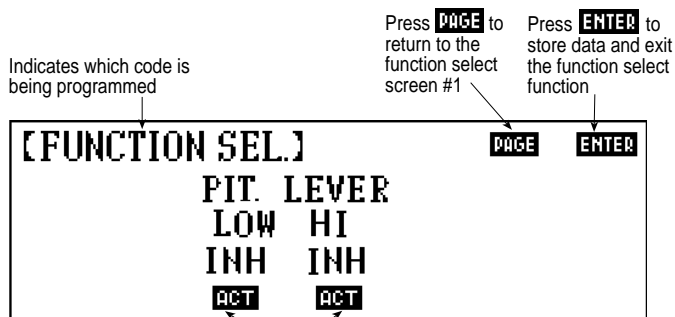


Touch **SEL** to activate Stunt Modes 3 and 4 and assign the designated switch (AIL or GEAR)

Touch **SEL** to select gear switch function (GEAR, HOLD, INH)

Touch **ACT** to activate AUX 2 switch

Touch **CLEAR** to inhibit the digital trim function in Stunt Modes 1–4, and hold



Press the **ACT** key to activate the low and high pitch trim levers

Extra Flight Mode Function (Flight Mode 3 and 4)

The Extra Flight Mode function allows two additional flight modes (3 and 4) to be activated and placed on the gear switch or the aileron dual rate switch.

Touch SEL located below the flight extra on the left-hand side of the screen once to activate the Flight Modes 3 and 4 on the gear switch (gear) and touch SEL again to activate Flight Modes 3 and 4 on the aileron dual rate switch.

Note: Flight Modes 3 and 4 work in conjunction with the flight modes N, 1, and 2 switch.

When the flight mode switch is in the Normal (N) position, Normal mode is selected regardless of the extra flight mode switch position. When the flight mode switch is in the #1 or #2 position, the actual flight mode is relative to the position of the extra flight mode switch. If the extra flight mode switch is on, the position 1 and 2 on the standard flight mode switch result in Flight Modes 3 and 4.

Separate throttle curves, pitch curves, stunt trims, tail curves, programmable mixes, swashplate timing, auto dual rates and gyro rates are available in Normal, Flight Mode 1, Flight Mode 2, Flight Mode 3 and Flight Mode 4. See these sections for details.

Gear Switch

Channel 5, gear switch, can be programmed in these different ways:

When the GEAR appears below GEAR SW on the screen, the gear two-position switch activates on Channel 5. Touch SEL and HOLD will appear. Now Channel 5 is activated with the throttle hold switch. Touch SEL again and INH (inhibit) appears. This inhibits Channel 5, and Channel 5 is now useful as a Slave channel for programmable mixing in this inhibit position.

AUX2 Switch

Channel 7, Auxiliary 2, can be programmed in these different ways:

When ACT appears below AUX2 SW on the screen, the AUX2 switch on the transmitter activates the function of channel 7.

When INH appears on the screen, Channel 7 is now useful as a slave channel for programmable mixing in this inhibited position.

Digital Trim Select

The Digital Trim Select function located at the lower right corner of the screen, allows the user to deactivate the Digital Trim Levers in Stunt Modes 1–4 and Hold, while retaining the previously established trim values.

The purpose of this feature is to allow the pilot to store the needed trim values for each flight mode, then deactivate the trim levers so that if the trim levers are accidentally moved during flight, no trim changes will occur.

Although the CLEAR box is displayed when inhibited (INH), the system does not actually clear the previously entered trim values, but rather they are stored in the system's memory. To clear previously established flight mode trim values, it will be necessary to re-activate this function (ACT), then zero the trim values from the main screen by accessing the desired flight mode via the flight mode switch.

This feature is very helpful to contest pilots as it eliminates the possibility for the pre-selected flight mode trim values to be accidentally altered during the heat of competition.

Please note that when the Digital Trim Select function is inhibited (INH), the digital trim levers will continue to function while in Normal mode.

Please also note that while this function is inhibited (INH), any change in trim settings while in normal mode will have no effect on the flight mode trim values established prior to the inhibiting (INH) of this function.

Pitch Trim Levers

The low pitch trim lever, located on the left side of the transmitter, changes the amount of pitch below the lowest point stored from center. The high pitch lever, located on the right side of the transmitter, varies the pitch above the highest point stored from center.

The pitch trim levers are quite useful for fine tuning your pitch settings for varying weather and/or flying conditions.

It is imperative that, prior to operating the pitch trim levers, you understand the Pitch Curve function, Code 68.

Just as the effect of the throttle trimmer can be observed through Code 18, Throttle Curve, the effect of the high and low pitch trim levers can be seen by accessing the Pitch Curve function, Code 68.

***Note:** Once the trim levers have been activated, they affect their designated pitch curve regardless of the flight mode switch position. The levers also remain effective when Throttle Hold, Code 16, is being used.*

***Note:** The low pitch trim lever only affects the pitch curve from the low pitch point, point L, up to the first pitch point, point 1. Also, the high pitch trim lever only affects the pitch curve from the last programmed pitch point up to the high point, H.*

Throttle Curve

The Throttle Curve function allows you to adjust the speed or change of throttle control on the helicopter. This throttle curve offers adjustable positions, or points, to enable the transmitter to match the power output needs of any helicopter and engine combination.

The Throttle Curve function's features work closely with the Pitch Curve function, Code 68, to offer the necessary flexibility when adjusting your helicopter for a higher degree of performance.

Note: *It's important that you understand completely the correlation between the Throttle Curve, Code 18, and the Pitch Curve, Code 68, prior to flying your aircraft.*

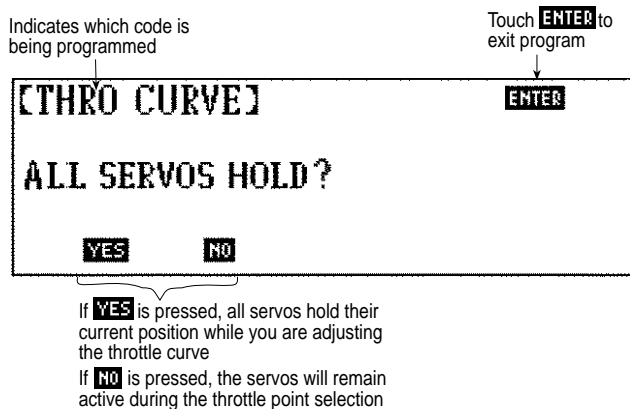
The PCM10X offers five separate throttle curves, including Normal, Flight Mode 1, Flight Mode 2, Flight Mode 3, and Flight Mode 4.

Accessing and Utilizing the Throttle Curve

Note: *Most pilots use the "N" or normal position of the flight mode switch for hovering, while positions 1 through 4 can be adjusted for various aerobatic maneuvers.*

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

The first screen will appear as follows:



If the YES key is pressed, all servos hold their current position while you are adjusting the throttle curve.

If the NO key is selected, the servos remain active during the throttle point selection.

Note: *We urge you to select the YES key when programming the throttle curve to freeze all servos. This will become second nature to you at the field and help to prevent a crash when programming the throttle curve while the helicopter is running. If*

the YES key is selected at this point, you will be required to move the throttle stick to its lowest position prior to exiting the Throttle Curve function.

After you have made your selection, the screen advances to the next screen in the throttle curve sequence. The appearance of this screen varies depending upon the throttle hold switch position (if active), flight mode switches, the throttle stick, and its respective trim locations.

Set Up Tip

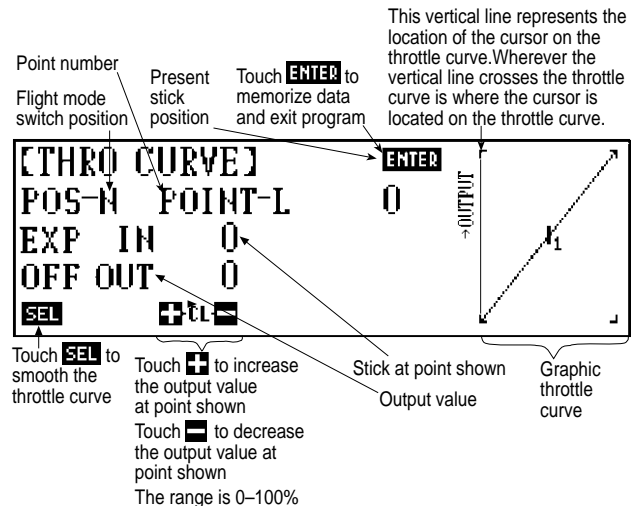
The PCM10X has the most sophisticated throttle curve system available. When you use this system in conjunction with the pitch curve, the options are endless. Some examples include:

You can flatten the pitch and throttle curve through the mid-position, which reduces the collective sensitivity in hover for more precise control. For switchless inverted flying, we recommend a U-shaped throttle curve with 0 stick position at 100% throttle, 50% stick at 50% throttle and 100% stick at 100% throttle. Idle Up 2 is used for switchless inverted flying.

By altering the amount of throttle versus pitch, you can accurately alter and control the rotor rpm at all stick positions.

Two-speed set-up (low hover rpm, high forward flight rpm) is easy to program. In normal mode (hover), a raised pitch setting and a lowered throttle setting yield a lower rpm. In Idle Up, a raised throttle and lowered pitch raise the rpm for more control authority. This two-speed set-up gives a soft, precise feel in hover, while permitting positive control authority for aerobatics when the idle ups are switched on.

If the throttle stick and throttle trim are at their lowest setting, and the flight mode switch is in the "N" or normal position, and the throttle hold switch is activated and in the "off" position, or if it is inhibited, the following screen will appear:



Note: *If the ATV, Code 12, is adjusted to match the throttle output (0-100%) you can read the throttle curve output value in percentage figures.*

Prior to actually adjusting your throttle curve points, a thorough understanding of the throttle curve screen is important.

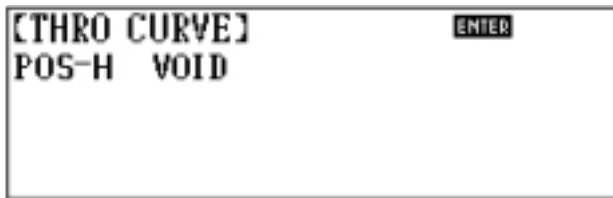
Features Common to All Five Flight Modes – N, 1, 2, 3, 4

Graphic Throttle Curve

The graphic throttle curve is located on the right side of the LCD display. Note the cursor and the vertical line where the cursor is located, which correlates to the throttle stick position at any given stick location. This cursor also serves to indicate the point that you are at in the throttle curve. The graph plot itself changes in relation to the inputs which you will begin to program shortly.

POS-N (1, 2, 3, 4)

This is the position indicator of the flight mode switch. If Throttle Hold (Code 16) is activated and in the “on” position when you enter the second screen, it appears as follows:

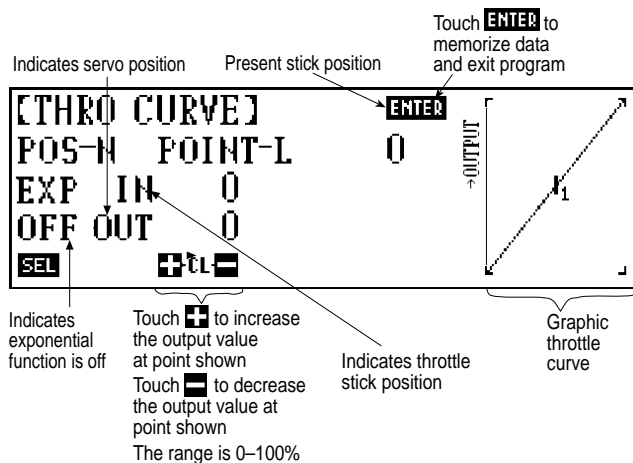


This lets you know that you cannot program a throttle curve for the throttle hold function. This position indicator may also exhibit POS-N, POS-1, POS-2, POS-3, and POS-4, depending upon flight mode switch position.

Flight Modes 3 and 4

The PCM10X offers up to five programmable throttle curves. The standard factory settings are set to allow the access of the normal Flight Mode, Flight Mode 1, and Flight Mode 2. In order to access Flight Modes 3 and 4, see Code 17, Function Select, in the Extra Flight Mode function section. Once selected, Flight Modes 3 and 4 settings are made identical to flight modes N, 1 and 2.

Note: The Flight Mode 3 and 4 switch can be selected on the gear switch or aileron/dual rate switch. See Code 17, Function Select, for complete information.



In & Out

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

Stick Position

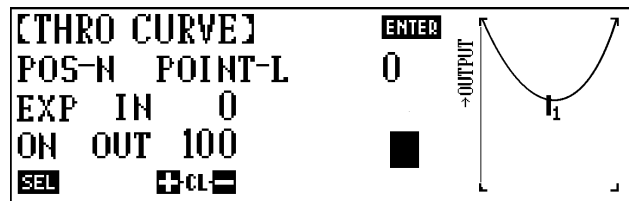
This value is represented numerically just below the ENTER key and changes to show the current stick position. You may find this useful when you want to move to the middle point position.

Stick Movement

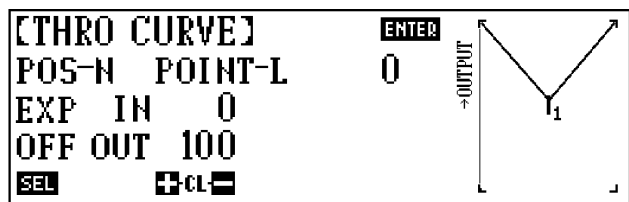
Changes to the point setting can be made by moving the throttle stick to the desired position (indicated by the cursor and the vertical line on the graphic throttle curve display) and then adding or canceling. See adding new points and/or clear operations, respectively.

Adding New Points

Any time the +, CL, - keys are replaced by the STORE key on the LCD, you can set a new point on the throttle curve. To do so, simply touch the STORE key. The PCM10X allows you to program two throttle points below half-throttle stick, one hovering point, and two throttle points above the half-throttle stick. There are also a high and a low throttle point that are automatically entered into your transmitter.



Throttle curve with exponential on.



Throttle curve with exponential off.

Exponential

An exponential function is available on each of the 5 throttle curves and is used to “smooth out” the throttle curve. First, it’s necessary to program the desired points on the throttle curves and adjust them to their desired positions. Then, press the SEL button and the PCM10X will automatically smooth the throttle curve.

Note: Exponential can be selected off or on in each of the five flight modes.

Clear Operations

When the display indicates that the throttle stick has achieved the desired point setting on the LCD screen, you can either press the + and - keys simultaneously or press the CL key to clear the desired point.

Note: Only this point will be cleared from the transmitter. As a result of removing one point, the other point numbers change accordingly. Their values do not change, only their point numbers. Their location on the curve remains the same regardless.

Point L: Preset to 0. (When the throttle trim is effective, returns to idle position.)

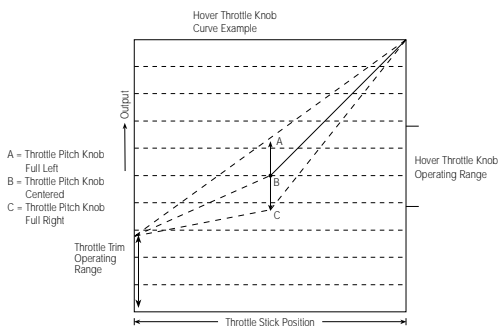
Point H: Preset to 100.

Middle Point: Cancels middle point.

Features Unique to the “N” or Normal Flight Mode

Hovering Throttle Knob

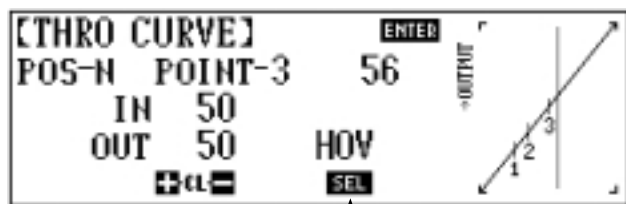
This knob is used to increase or decrease the hovering point of the throttle curve. This relates directly to either faster or slower rotor head speeds, depending on how the knob is adjusted. It is located on the right face of the transmitter and has an adjustable range of +/-10.



Note: This knob is not functional unless a hovering point has been selected. Please see information following on how to activate.

Hovering Point Selection

Hovering Point Selection allows you to select the points that will be affected by the hovering throttle knob (+/-10) when the flight mode switch is in the Normal (N) position. The screen appears as follows:



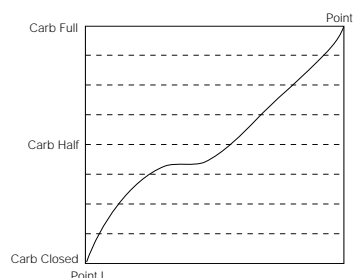
Touch **SEL** to activate hover throttle knob adjustment at desired points

Note: When the SEL key appears in the lower middle portion of the LCD, touch it to activate that position with the hovering throttle knob. The six programmable points can be selected or inhibited to work with the hovering throttle knob. Failure to select a hovering throttle point will render the hovering throttle knob inactive.

Throttle Trim Settings

The throttle trimmer increases/decreases the output value of point L (Low) to point 1 in Flight Mode Switch position “N” (Normal) only. It is not active in any other flight mode switch position. A presentation of the throttle trimmer effect can be seen when programming the throttle curve. The trimmer range is also depicted in the hovering knob operating range graph on the preceding page.

A typical flight curve for the “N” position may appear, similar to the following:



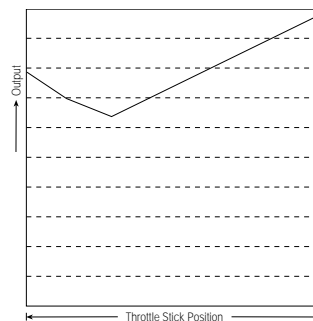
The reason that the curve appears as it does, instead of as a linear curve, is simple. The carburetor operation is not truly linear. You achieve a larger rpm and horsepower gain over the first portion of the carburetor opening than you do over the last portion of its travel.

Flight Modes 1, 2, 3, & 4

These flight modes allow for four different set-ups for various types of maneuvers.

Although the throttle curve points are selected in the same manner and have the same result as those in the “N” or Normal Flight Mode, you will not be asked to choose a hovering throttle point. Therefore, the hovering throttle knob is not effective in any of these four flight modes.

The points on the throttle curve form what is commonly called a U-shaped curve or a V-shaped curve. This is a direct result of the pitch curve and, therefore, of throttle change requirements for aerobatic flight. A typical curve for these flight modes is:



Throttle curve shown is for typical pitch curve with 5° pitch at 1/2 stick, and 0° pitch at 1/4 stick.

Note: For switchless inverted flight, the curve may be a sharper V shape to meet the necessary pitch/throttle requirements.

Tips for Setting the Throttle Curve

First and foremost, although the PCM10X offers many throttle curve points, you do not have to use each and every one of them. Many experts simply use three or four points for their aerobatics. They find it is not necessary to use all seven points.

Next, adjust the throttle curve for the "N" or Normal flight mode position, prior to moving on to the aerobatic flight modes.

Remember you can add new points any time you see the STORE key. Also, to change the output or throttle servo value at any given point, simply touch the + key. To decrease the output value, simply touch the - key. To cancel a given point, find it with the blinking cursor/vertical line on the graphic display and touch the + and - keys simultaneously or the CL key.

In order for the hovering throttle knob to be functional, a hovering throttle point must be chosen by touching the SEL key when it appears on the LCD screen.

It is not necessary to touch the ENTER key between throttle curve setups for the PCM10X. You can simply move the flight mode switch from one position to the next. When you are completely finished with your throttle curves, touch the ENTER key to memorize all data inputs, as well as to exit the program.

Note: If you answered YES to the question "All servos hold?" you need to return the throttle stick to the low position and the flight mode switch to the Normal position in order to exit the program and operate your model. This is a built-in safety feature, and you will see the warning message "Move Throttle Stick Low Position, Flight Mode Norm Position" on the LCD display.

Automatic Dual Rate

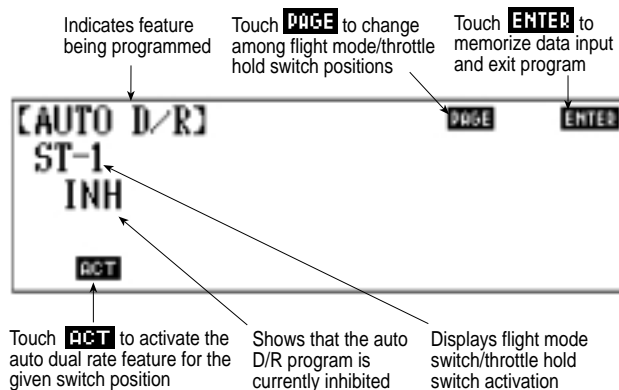
The Automatic Dual Rate function allows you the opportunity to change the dual rate and exponential values of the elevator, aileron, and rudder servos by changing the flight mode or the throttle hold switch positions. In other words, you can select any throw rate at any given flight mode and throttle hold switch position for the elevator, aileron and rudder channels. This feature simplifies the operation of the switches during flight.

In addition, your new PCM10X system will now also display the independent dual rate values (left, right, up, down) as established in the dual rate function, Code 13.

Accessing and Utilizing the Automatic Dual Rate Function

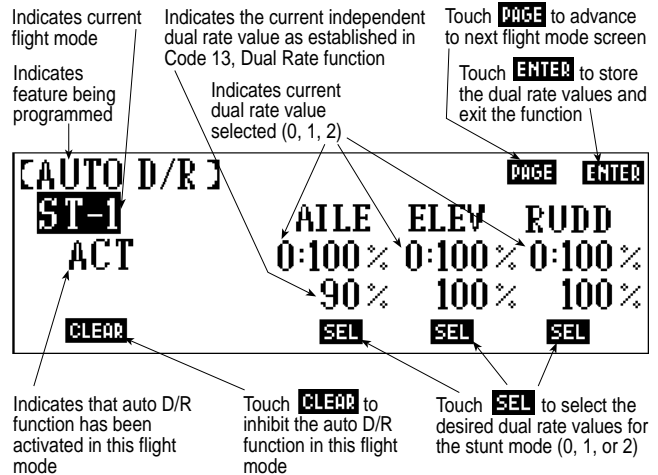
To access the Automatic (auto) Dual Rate function, enter Code 23 in the code number access selection or use the direct mode method.

The screen appears as follows:



Touch the ACT key to activate the automatic dual rate function. You can also select flight mode one, flight mode two, flight mode three, or flight mode four switch or throttle hold switch position at this time. To do so, touch the PAGE key. Your selections are ST-1, ST-2, ST-3, ST-4, for switch positions 1, 2, 3, and 4 respectively, or HOLD for the throttle hold switch.

Your LCD display will now show the active mode screen:



Touch CLEAR to inhibit Automatic Dual Rate function for that switch position.

Touch SEL for the dual rate selection values.

Note: You may only choose from the respective values that you have programmed in Code 13, Dual Rate and Exponential function. You can, however, select between the 0, 1, and 2 values on each of the three channels. This is the servo throw value for each of the three channels that you automatically have when you switch the flight mode and throttle hold switches from positions 1, 2, 3, 4 and hold.

After completing the auto D/R set-up for this switch position, press the PAGE key to advance to the next switch position. In our example, the next flight mode position is ST-2.

Note: You have to activate the auto d/r for each switch position. When the flight mode switch is in the "N" or normal flight mode position, control priority is returned to the dual rate switches for normal operation.

Data Reset

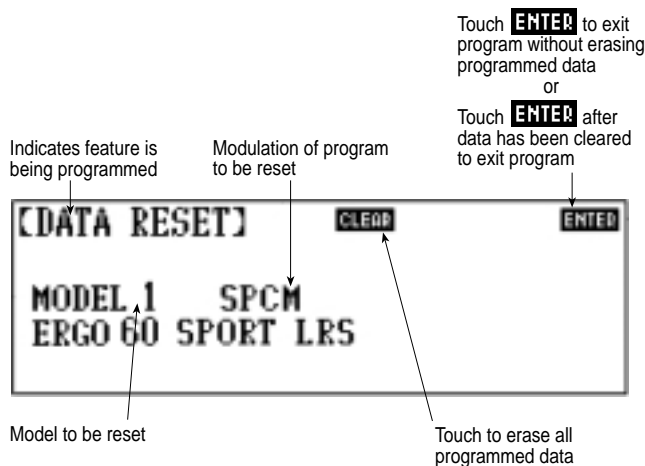
The Data Reset function enables the pilot to clear all of the data for a particular model from the transmitter memory. Once this feature has been used, all settings return to their factory default or pre-set positions and values.

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

Accessing and Utilizing the Data Reset Function

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

The screen will appear as follows:



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

Note: Once you have cleared the programmed data from a given model memory, you will not be able to recall the cleared information.

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

Note: As part of the factory default settings, when the transmitter is cleared, the modulation automatically returns to S-series PCM. It is crucial to note which modulation is compatible with your receiver. Refer to Code 85, Modulation, for more information on this subject.

To exit the program touch the ENTER key.

Note: You will be unable to access the Data Reset function once the battery voltage alarm has sounded. For more information please refer to Section 6.1 of this manual.

8.10 Code 41

Rudder → Throttle Mixing: Stunt (Flight) Modes 1–4

The Rudder-to-Throttle Mixing function corrects any under or over speeding of the engine resulting from load changes placed upon the engine when the tail rotor control is used.

Rudder → throttle mixing, when used in stunt (flight) modes, enables your model to maintain a constant main rotor RPM when performing tail rotor maneuvers such as 540 stall turns, pirouettes, pinwheels, fast sideways flight, etc.

The adjustment of rudder → throttle mix for use in aerobatics (stunt modes) varies from that of a hovering rudder → throttle mix set-up since it's necessary for the rudder to increase throttle in both directions due to the increase in tail blade pitch, which increases the load or resistance to the engine.

In general, most pilots find that although the throttle must be increased in both rudder stick directions, it's normal to have a lesser value in the rudder direction that rotates the model "with" the torque of the tail rotor.

Note: When using the Rudder → Throttle Mixing function for Stunt (Flight) Modes 1–4 only, it is important that the mix is not also actuated in the normal (hover) mode, since proper adjustment of the rudder → throttle mix for normal mode use varies greatly.

Set Up Tip

A good starting value is approximately 20% left stick, 30% right stick (values are for clockwise rotation models).

Caution: Be sure to verify before flying that the rudder → throttle mixing is moving the throttle lever in the desired direction, in the desired flight modes.

You will find this function most useful when performing pirouettes or aggressive tail rotor maneuvers with your helicopter. This function can be useful either in normal mode, enabling you to maintain a constant rotor rpm and altitude for precision hovering, or in Flight Modes 1–4 where additional throttle is needed in both directions to offset the additional loads to the engine when tail rotor is applied.

Since the adjustment for each of these uses varies, please refer to the sections following for further information.

Rudder → Throttle Mixing: Normal (Hover) Mode

As mentioned previously, rudder → throttle mix used in normal (hover) mode only enables your model to maintain a constant altitude and rotor rpm when performing tail rotor maneuvers such as pirouettes by adding or removing throttle as needed.

When performing tail rotor pirouettes with the tail rotor torque only (e.g., in the same direction as), the main rotor rpm will have a tendency to increase due to the "unloading" of the tail rotor, causing the engine to change speed as well. The opposite effect is also true: When performing maneuvers against the torque of the tail rotor, the main rotor rpm will have a tendency to decrease, causing the engine to lose rpm and causing a loss of altitude.

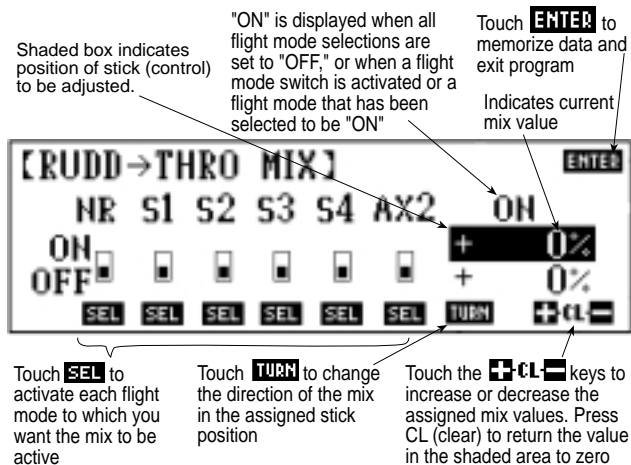
Given this information, it is necessary to adjust the rudder → throttle mixing so the throttle will increase when the rudder is moved to increase the tail rotor torque, and decrease when the rudder is moved with the torque of the tail rotor.

With most helicopters using a clockwise rotation, moving the rudder stick to the left will decrease the needed throttle, while moving the rudder stick to the right will increase the needed throttle.

Accessing and Utilizing the Rudder → Throttle Mix

To access the Rudder → Throttle Mix, enter code 41 in the code number access selection or use the direct mode method.

Your screen will appear as follows:



Note: When using the Rudder → Throttle Mix function for normal (hover) mode only, it is important that the mix only be activated in the normal mode, since proper adjustment of the rudder → throttle mix for stunt mode use varies greatly.

Note: To move the shaded box from the left to the right value, and vice versa, simply hold the rudder stick in the corresponding direction.

Set Up Tip

A good starting value for each direction is approximately 10–15%.

Caution: Be sure to verify before flying that the rudder → throttle mixing is moving the throttle lever in the desired direction in the desired flight mode.

Aileron → Throttle Mixing (2-1 Mix)

The Aileron-to-Throttle Mixing function corrects any under or over speeding of the main rotor resulting from load changes placed upon the engine when the aileron control is used. The most common usage of aileron → throttle mix is for stunt (flight) modes 1-4, allowing the main rotor rpm to remain consistent throughout aerobatic maneuvers. It is not necessary to use aileron → throttle mixing in normal (hover) mode since control inputs are small and much less aggressive.

Aileron → throttle mixing, when used in stunt (flight) modes 1-4, enables your model to maintain a constant main rotor rpm while performing aileron maneuvers such as rolls, split-S, hovering rolls, rolling stall turns, etc., by adding throttle each time aileron is applied.

Shaded box indicates position of stick (control) to be adjusted.

"ON" is displayed when all flight mode selections are set to "OFF," or when a flight mode switch is activated or a flight mode that has been selected to be "ON"

Touch **ENTER** to memorize data and exit program

Indicates current mix value

Touch **SEL** to activate each flight mode to which you want the mix to be active

Touch **TURN** to change the direction of the mix in the assigned stick position

Touch the **+CL-** keys to increase or decrease the assigned mix values. Press CL (clear) to return the value in the shaded area to zero

Note: When using the Aileron → Throttle Mix function for stunt (flight) modes 1-4, it is important that the mix is not also activated in the normal (hover) mode since additional throttle is not required for normal hovering maneuvers and will cause the main rotor rpm to vary, which is an undesirable situation.

Set Up Tip

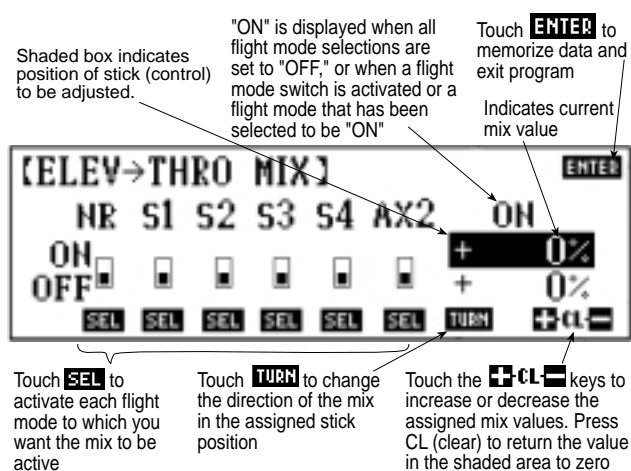
A good starting value is approximately 20-30% in each direction.

Caution: Be sure to verify before flying that the aileron → throttle mixing is moving the throttle lever in the desired direction (increasing the throttle when the aileron stick is moved) in the desired flight modes.

Elevator → Throttle Mixing (3–1 mix)

The Elevator → Throttle Mixing function (much like aileron → throttle mixing) corrects any under or over speeding of the main rotor resulting from load changes placed upon the engine when the elevator control is used. The most common usage of the Elevator → Throttle Mixing function is for Stunt (Flight) Modes 1–4, allowing the main rotor rpm to remain consistent throughout aerobatic maneuvers. It is not necessary to use Elevator → Throttle mixing in normal (hover) mode since control inputs are small and much less aggressive.

Elevator → Throttle Mixing, when used in stunt (flight) modes 1–4, enables your model to maintain a constant main rotor rpm while performing elevator maneuvers such as stall turns, loops, tumbles, flips to inverted hover, etc., by adding throttle each time elevator is applied.



Note: When using the Elevator → Throttle Mix function for stunt (flight) modes 1–4, it is important that the mix is not also activated in the normal (hover) mode since additional throttle is not required for normal hovering maneuvers and will cause the main rotor rpm to vary, which is an undesirable situation.

Set Up Tips

A good starting value is approximately 20–30% in each direction.

Caution: Be sure to verify before flying that the elevator-throttle mixing is moving the throttle lever in the desired direction (increasing the throttle when the elevator stick is moved) in the desired flight modes.

Gyro Sensitivity Adjustment

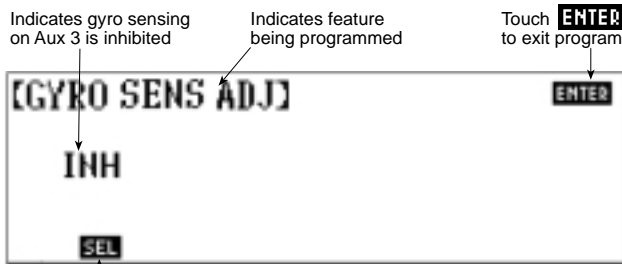
The purpose of this function is to allow for in-flight adjustment of the gyro sensitivity.

Note: This function was designed to be used with gyros that feature in-flight adjustability, such as JR's NEJ-450, NEJ-3000 Piezo Gyros, and will not function with standard dual rate gyros.

Accessing and Utilizing the Gyro Sensitivity Adjustment Function

To access the Gyro Sensitivity Adjustment function, enter Code 44 in the code number access selection or use the direct mode method.

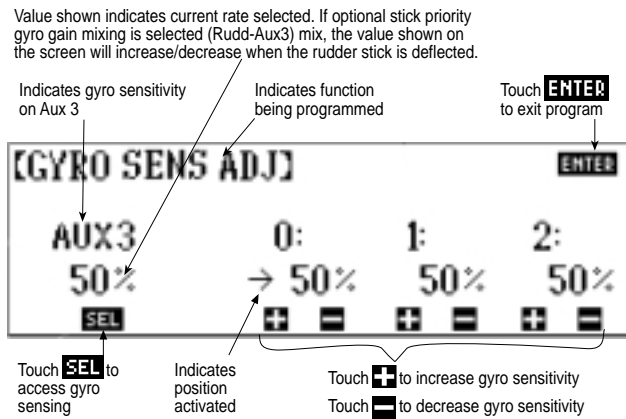
Your LCD will appear as follows:



Touch **SEL** to activate gyro sensing on Aux 3 switch
 Touch **SEL** again to access automatic gyro sensing

Touch the SEL key to activate the sensitivity adjustment function on switch auxiliary 3.

Your screen now displays:



The gyro sensing adjustment can be accessed in two different ways.

Aux 3

Touch the SEL key until AUX 3 appears on the left-hand side of the screen. In this mode, the auxiliary 3 switch is used to select from two adjustable gyro rates (0 and 1).

Note: The gain rate 2 is not accessible in this mode.

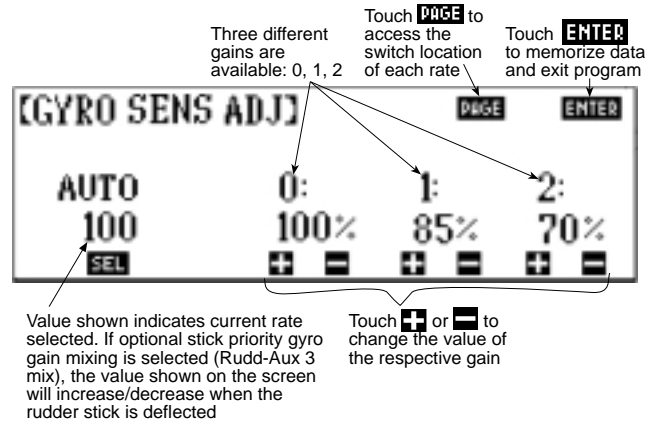
When the AUX 3 switch is in the rearward position, an arrow will appear below the 0: indicating that the 0 value has been selected. When the AUX 3 switch is in the forward position, an arrow will appear below the 1: indicating that the 1 value has been selected. Press the + or - keys to alter the value of the 0 and 1 positions.

Note: Please refer to your specific gyro instructions for suggested gain settings.

Automatic Gyro Sensing Adjustment

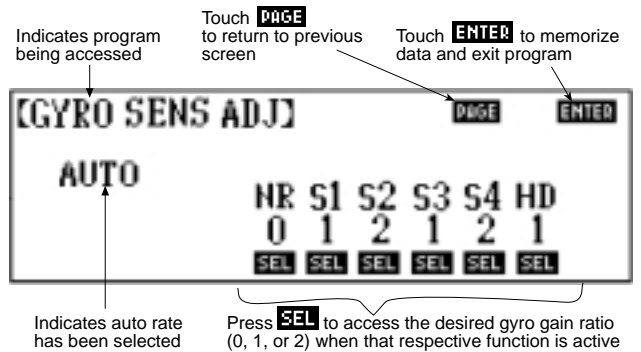
The PCM10X allows for up to three gyro gain rates to be set and any of the three can be programmed to be automatically activated in Normal flight mode, Flight Mode 1, Flight Mode 2, Flight Mode 3, Flight Mode 4, and Throttle Hold.

Press the SEL key until AUTO appears in the left-hand portion of the screen. Three values can now be set by touching the + or - key below its corresponding value.



Press the PAGE key to enter the gyro sensing switch selection screen. Six flight modes will appear across the center of the screen:

- NR: Normal Flight Mode S4: Flight Mode 4
- S1: Flight Mode 1 HD: Throttle Hold
- S2: Flight Mode 2
- S3: Flight Mode 3



Press the SEL key below each flight condition to select one of the three gyro rates programmed in the previous screen. Then when that flight condition is activated, the gyro rate automatically switches to that gyro gain rate.

Note: Code 44's percentage adjustment values only work when using a gyro that is equipped with proportional gyro gain adjustments that are adjustable from a transmitter like JR's NEJ-3000, or NEJ-450, Piezo Gyros. Standard dual gain gyros cannot be proportionally adjusted from the transmitter in Code 44. However, if a zero value percentage is selected in the 0 position and a 100% value is selected in the 1 position, dual sensing gyros will switch between their selected rates on their manual gain control boxes when accessing that flight condition. Because there are only two position available on dual sensing gyros (like the JR NEJ-120), only position 0 and 1 should be used.

8.14 Code 47

Tail Rotor Curve

The new PCM10X is equipped with a multi-point tail pitch curve mix for each flight mode (Normal, Stunt 1-4), providing a level of tuning never before possible. This updated function now replaces the standard up/down tail mixing in Normal mode with a highly precise multi-point tail curve as found in Flight Modes 1-4.

The PCM10X system also offers a new multi-point tail rotor pitch curve function for each flight mode, replacing the previous +P/-P and up/down tail rotor mixing found in the previous PCM10, 10S, and 10Sx systems.

This new multi-point tail curve feature allows the user to select point locations to correspond with the established points of the throttle (Code 18) and pitch (Code 68) curves, and also the ability to adjust each of these 8 points independently to perfectly match and synchronize the tail rotor curve compensation for unmatched precision.

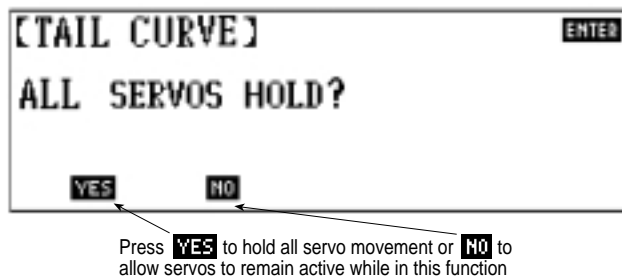
The function of the Tail Rotor Curve function is to mix tail rotor inputs with the throttle/collective function to counteract torque from the main rotor blades. Because of varying torque from different power settings, you have to vary the tail rotor pitch at the same time. If the tail rotor curve mixing is set up properly, your helicopter should ascend and descend without a tendency for the nose to move in either direction.

Note: The tail rotor curve mixing is not active when the throttle hold switch is activated and on, yet the rudder holds a preset position that you determine, which is necessary for a slipper type tail rotor drive system.

Accessing and Utilizing the Tail Rotor Curve Function

To access the Tail Rotor Curve function, enter Code 47 in the code number access selection or use the direct mode method.

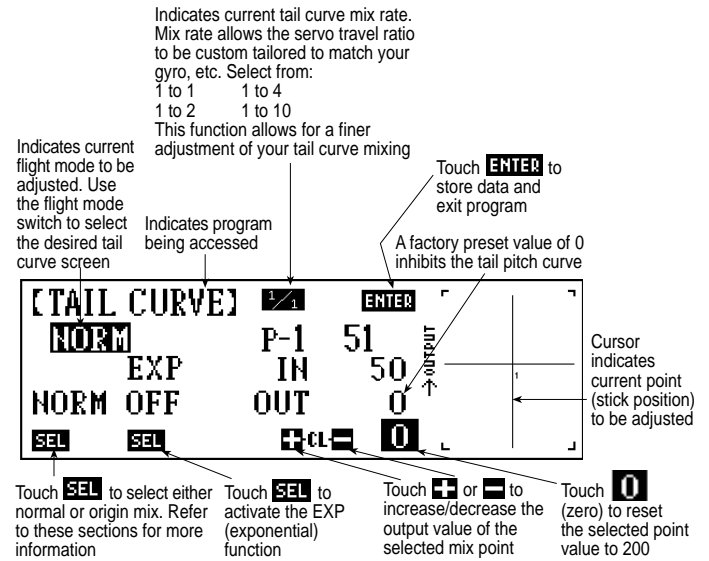
The screen will appear as follows:



If the YES key is pressed, all servos hold their current position while you are adjusting the tail rotor curve.

If the NO key is selected, the servos remain active during the tail rotor curve adjustment. This is useful for initial bench testing and setup with the engine off.

The screen will now advance to display:



Prior to adjustment of the tail curves, make sure your transmitter is in the desired flight mode via the flight mode switch.

As noted on the graph, the factory preset value for the tail pitch curve is 0% (off) with a single point selected at 50% output (1/2 stick). At this setting, there will be no tail rotor compensation. As previously mentioned, a total of 8 independently adjustable points can be selected.

Adjustment of the multi-point tail rotor curves is very similar to adjusting the pitch (Code 68) and throttle (Code 18) curves. By moving your throttle stick's position, the position of the vertical line on the graph at the right of your screen can be moved. Whenever STORE appears at the bottom center of your screen, an additional point can be located at this stick position.

Understanding the Tail Curve Functions

In and Out

IN refers to the internal stick position of your gimbal stick. OUT refers to the actual position of the servo. The range is adjustable from 0-100 in both cases. You are able to adjust the output value by pressing the + or - keys to increase/decrease the respective values. If you press either the CL or the + and - keys simultaneously, you will reset the output value back to the corresponding output value and also eliminate any point that has been assigned to that position.

If the 0 key is pressed, the out position at the current stick/point location will be reset to zero and no mixing will take place at that selected point.

Stick Position

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

Stick Movement

Changes to the point setting can be made by moving the throttle stick to the desired position (indicated by the vertical line on the graphic display) and then adding or canceling. See the “Adding New Points” and/or “Clear Operations” sections below for further information.

Adding New Points

Anytime the +, CL, or - keys are replaced by the STORE key on the LCD screen, you can add an additional point in that stick position to the tail rotor curve. To do so, simply touch the STORE key.

Clear Operations

To remove a selected point from the tail rotor curve, simply move the gimbal stick to the desired point and press either the + and - keys simultaneously or press the CL key to clear the desired point.

Note: Only the selected point will be cleared from the tail pitch curve. As a result of removing one point, the other point numbers will change accordingly. The values established for the remaining points will not change, only their point numbers. Their location on the curve will remain the same.

Mix Rate

The Mix Rate function found on the Normal (hover) mode screen, is designed to allow variable adjustment of the tail rotor curve mixing output in modes Normal and Flight Modes 1–4.

This function allows the size and/or overall travel value of the tail rotor curves to be custom tailored to suit the specific gyro system to be used. The mix rate values that are available are as follows:

- 1/1: Provides a 1 (100%) to 1 (100%) servo throw to tail mix value
- 1/2: Provides a 1 (100%) to 2 (50%) servo throw to tail mix value
- 1/4: Provides a 1 (100%) to 4 (25%) servo throw to tail mix value
- 1/10: Provides a 1 (100%) to 10 (10%) servo throw to tail mix value

So what this means, for example, is that if your tail rotor curve is adjusted for a 1/1 stunt mix rate and has an overall 10% variance from center to full left right stick, switching to a mix rate of 1/2 would allow your tail rotor curve to be increased from a 10% variance, to approximately a 20% variance, allowing a more refined adjustment of the tail rotor curve. Conversely, if you went from a 1/1 mix rate to a 1/4 mix rate, your tail rotor curve variance would be increased from 10% to approximately 40% overall.

It is suggested that your tail rotor curves be adjusted initially in the 1/1 mix rate and transferred to the 1/2, 1/4, or 1/10 mix rates as needed.

A suggested minimum tail rotor curve variance is no less than 20% overall. If your final tail rotor curve in mix rate 1/1 is less

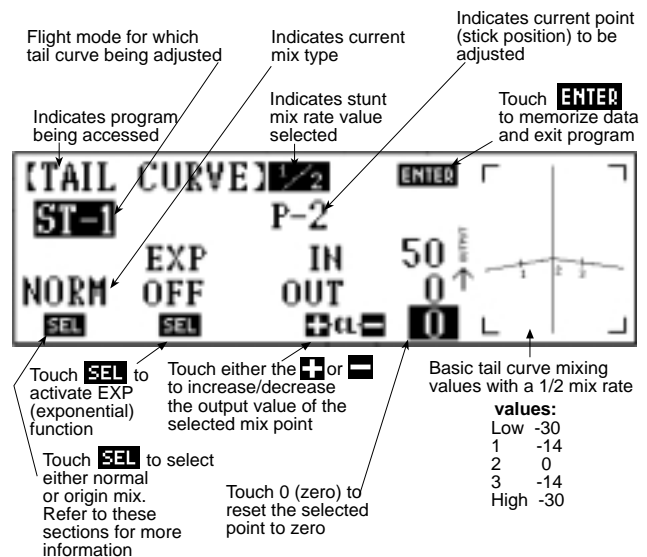
than 20%, you would then change the mix rate to 1/2, readjust your mixing values (double values approximately), and test fly.

It should also be noted that the various mix rates will also affect your center stick position, unless a value of 0% is maintained at the center (0° pitch) position.

It is suggested that you first become familiar with the workings of the multi-point tail rotor curves before adjusting the values of the mix rate.

It is also suggested that you initially establish your tail rotor curve in mix rate value 1/1 as shown below to both become familiar with the tail rotor curve function, and also to establish the mixing values from which to multiply to establish a different mix rate.

The screen shown below shows the same tail rotor curve as shown in the previous example, but with a stunt mix rate of 1/2. You will notice that all point values, with the exception of the center position 0 value, have been doubled (x2) to calculate the proper mixing values for the stunt mix rate of 1/2.



Tail Curve 0 Pitch Value Position

Prior to establishing values for the tail rotor curves, it is first suggested that the main rotor blades' 0 degree position be established for each of the flight modes and a corresponding point be selected on each of the required tail rotor curves. To do this, simply attach a pitch gauge to your main rotor blades with the gauge set at 0 degrees, then establish and note the exact stick output position for each flight mode to be used.

Once these positions have been noted, they can be used to establish a 0 degree point in each flight mode. In other words, if your normal mode pitch curve is at 0 degrees pitch at 25 percent stick output, then you would establish a point at that position.

Conversely, if your stunt mode 1 and 0 degree pitch position is at 50 percent stick output, then you would establish that point as the center position for your tail curve.

It's important that a 0 degree pitch point be established for each flight mode so that this point can remain at a value of 0 on the tail curve screen.

This method of set up is necessary so that any minor changes to the main blade pitch curve can be compensated for through the use of the rudder sub-trim or a mechanical linkage adjustment.

Tail Rotor Curve Point Selection

Although you new PCM10X allows you to select up to 8 points for each tail curve, it is generally much easier to start with the minimum number of points required (3) and increase the number of points as needed until the correct tail curve is established.

It is recommended that these 3 points be established at the low, 0 degree, and high pitch positions. Once the tail curve has been tested and adjusted using only the three points, additional points can be added at the 1/4 and 3/4 stick positions, or matched to your pitch curve point locations for a more precise match to your pitch curve.

This method has been found to be the easiest and quickest way to establish a proper tail pitch curve.

Set Up Tip

When selecting your tail rotor curve points, it's desirable for these points to be at the same input location as your pitch and throttle curve point. Please refer to "Charts A" at right.

Tail Rotor Curve Compensation Direction

In most cases, a helicopter with a clockwise main rotor rotation will require the tail rotor curve to be set-up as an "inverted" V. Conversely, a counterclockwise main rotor rotation will require the tail rotor curve to be set-up as an "upright" V. Please refer to the diagrams below for an example of a standard "inverted" V curve for clockwise rotation models.

Flight mode for which the tail curve is being adjusted

Indicates program being accessed

Indicates current mix type

Indicates stunt mix rate value selected

Indicates current point (stick position) to be adjusted

Touch **ENTER** to memorize data and exit program

Touch **SEL** to activate EXP (exponential) function

Touch either the **+** or **-** to increase/decrease the output value of the selected mix point

Touch **SEL** to select either normal or origin mix. Refer to these sections for more information

Touch **0** (zero) to reset the selected point to zero

Basic tail curve mixing values with a 1/1 mix rate

values:	
Low	-15
1	-7
2	0
3	-7
High	-15

Normal Mode Tail Curve Example

The tail curve screen shown below is a good example of a standard normal mode tail curve to match a pitch curve set up of approx -5 degrees (low), +5 degrees (half) and +10 degrees (high) pitch setup. These values are for a clockwise rotation (right direction) model. The values listed are a good starting point from which to establish your final tail pitch curve.

Note: All values shown are "input" stick values.

As you will see, the tail pitch curve is set up using only 3 points (low, half, and high). Once these points are established through flight testing, then two additional points at 25 (1/4) and 75 (3/4) percent stick output may be added and fine tuned to match the points on the pitch and throttle curves shown.

Flight mode for which tail curve is being adjusted. Use flight mode switch to select desired tail curve

Indicates program being accessed

Indicates stunt mix value selected

Touch **ENTER** to memorize data and exit program

Cursor indicates current point (stick position) to be adjusted

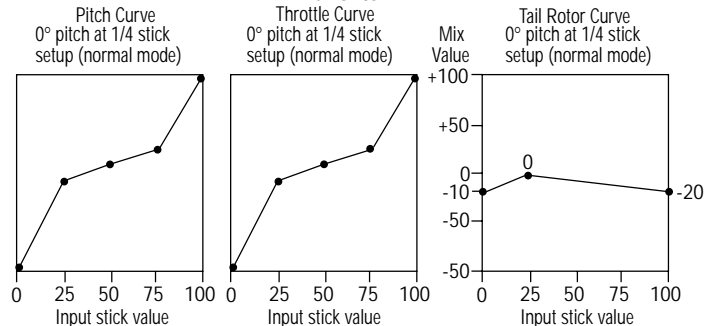
Touch **SEL** to select either normal or origin mix. Refer to these sections for more information

Touch **SEL** to activate the EXP (exponential) function

Touch **+** or **-** to increase/decrease the output value of the selected mix point

Touch **0** (zero) to reset the selected point value to 0

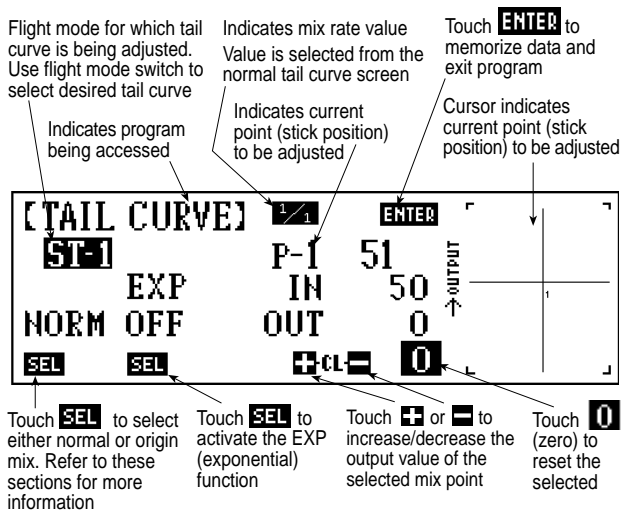
Charts A



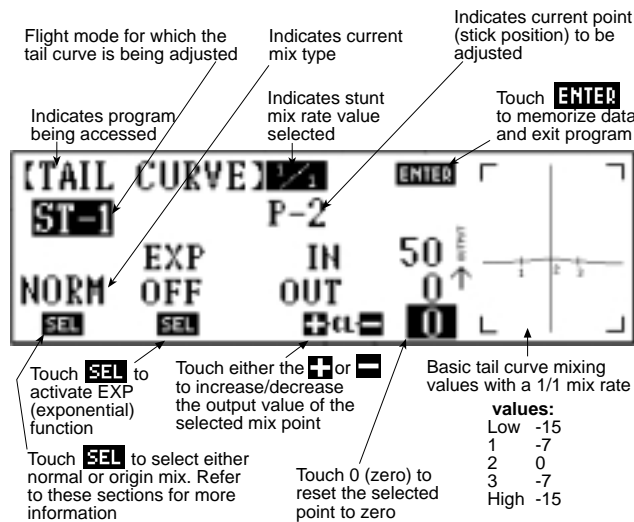
As noted, all input stick values are set to the same position for each of the three curves (0, 25, 50, 75, 100).

Stunt Mode Tail Curve Examples

To access the stunt mode tail curves from the Normal mode tail curve screen, simply move the flight mode switch to the desired flight mode position to be adjusted. The screen will appear as shown on the following page.

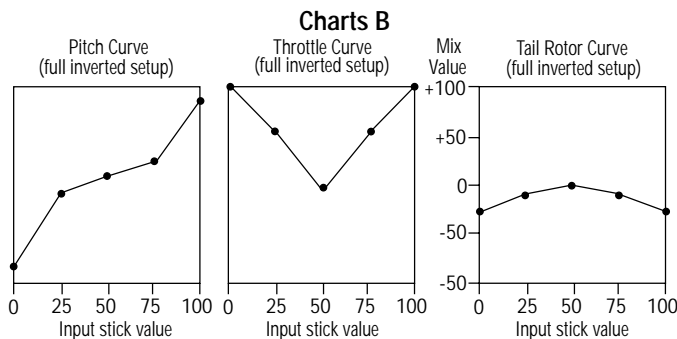


The tail curve screen shown below is a good example of a stunt mode tail curve to match a pitch curve setup of approx -10 degrees (low), 0 degrees (half), and +10 degrees (high) pitch setup. These values are for a clockwise rotation (right direction) model. The values listed are a good starting point from which to establish your final tail pitch curve.



Note: All values shown are “input” stick values.

As you will see in “Charts B” below, this tail curve has been set up using 5 points that exactly match that of the pitch and throttle curves. As mentioned previously, a more simple three-point tail curve can be used initially if desired.



As noted, all input stick values are set to the same position for each of the three curves (0, 25, 50, 75, 100).

Normal Mode Flight Trimming

Select the hovering pitch point as previously described.

Set the up-mix (right side of mix) so the helicopter climbs out without yawing left or right (use the chart below).

Readjust your up mix.

Set the down-mix (left side of mix) so your helicopter does not yaw during descent.

Note: The reactions below all pertain to a rotor blade that is clockwise or right. For a CCW blade, reverse the curve.

Helicopter Action (symptom)	Your Reaction (cure)
The nose goes left when climbing	Increase the up-mix percentage—this will bring the nose to the right.
The nose goes right when climbing	Reduce the up mix percentage—this will bring the nose to the left.
The nose goes left when descending	Reduce the down mix percentage—this will bring the nose to the right.
The nose goes right when descending	Increase the down mix percentage—this will bring the nose to the left.

Note: When climbing out or descending, your throttle collective stick must be increased/decreased to its respective travel limits. Failure to do so also results in an erroneous tail rotor mix.

Note: The actions and reactions above are applicable to the Normal flight mode only. The tail rotor curve mix for the stunt modes needs to be corrected in a different manner. For more information, refer to the Stunt Mode Flight Trimming chart below.

Stunt Mode Flight Trimming

Helicopter Action (symptom)	Your Reaction (cure)
In vertical flight at 0° pitch, the nose goes right.	Increase/decrease the digital trim (Code 25) value in the desired stunt mode until the nose no longer yaws.
In vertical flight at 0° pitch, the nose goes left.	Increase/decrease the digital trim (Code 25) value in the desired flight mode until the nose no longer yaws.
In upright flight at full positive pitch, the nose goes right.	Decrease the tail curve high pitch value until the nose no longer yaws.
In upright flight at full positive pitch, the nose goes left.	Increase the tail curve high pitch value until the nose no longer yaws.
In inverted flight at full negative pitch, the nose goes right.	Increase the tail curve high pitch value until the nose no longer yaws.
In inverted flight at full negative pitch, the nose goes left.	Decrease the tail curve high pitch value until the nose no longer yaws.

Standard Programmable Mixing

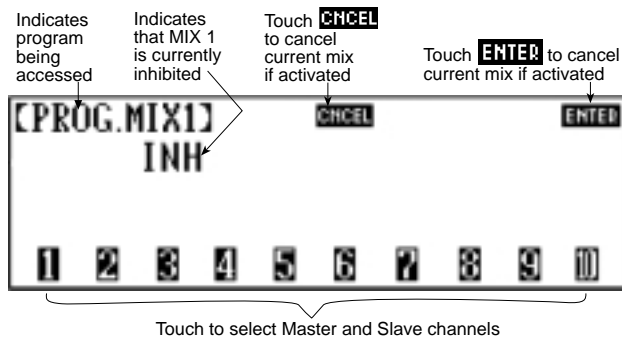
The PCM10X offers you four (4) standard free programmable mixers to mix to and from all ten (10) channels of the transmitter as you wish. These mixers enhance or correct the particular flight characteristics of your helicopter.

Note: All standard programmable mixers are proportional. Therefore, a small input of the master channel yields a small output of the slave channel.

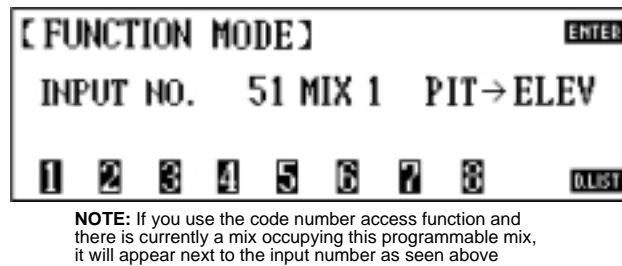
Accessing and Utilizing the Standard Programmable Mixing Function

To access the Programmable Mixing function, enter the proper code, 51-54, in the code number access selection or use the direct mode method. The screen will appear as follows.

Initial screen before mix has been assigned.



Initial screen after mix has been assigned:



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

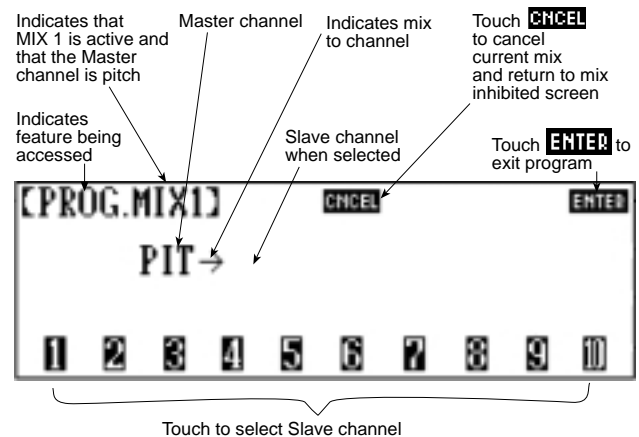
Channel #	Receiver Channel	Complete Channel Name
1	THRO	Throttle
2	AILE	Aileron
3	ELEV	Elevator
4	RUDD	Rudder
5	GEAR	Gear/Retract
6	AUX1	Auxiliary 1 (pitch/collective)
7	AUX2	Auxiliary 2
8	AUX3	Auxiliary 3 (gyro gain)
9	AUX4	Auxiliary 4
10	AUX5	Auxiliary 5

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

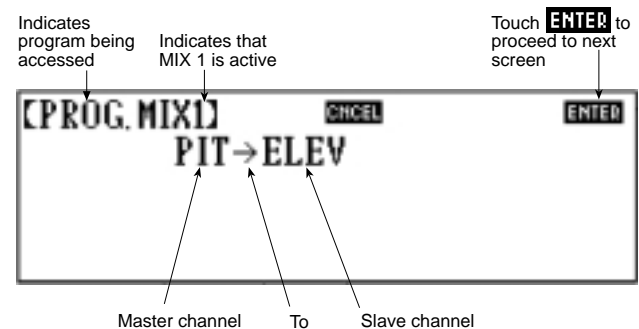
The second number key selected becomes the Slave channel. The Slave channel is the channel which is being mixed into the Master channel. You can also think of it as the controlled channel for the mixing feature.

For example, you want to mix the pitch channel to the elevator channel.

Pitch is the Master, or controlling, channel. Elevator is the Slave, or controlled, channel. The initial screen shows that the mixing feature is inhibited. However, after pitch is selected the screen will appear as follows:

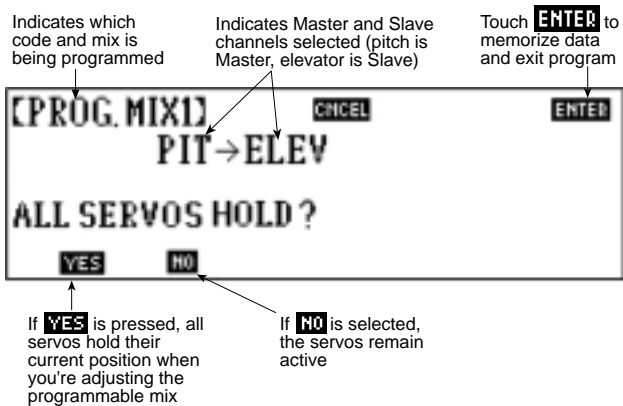


Next, choose the Slave channel — in our example, elevator. The screen will now change to display:



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

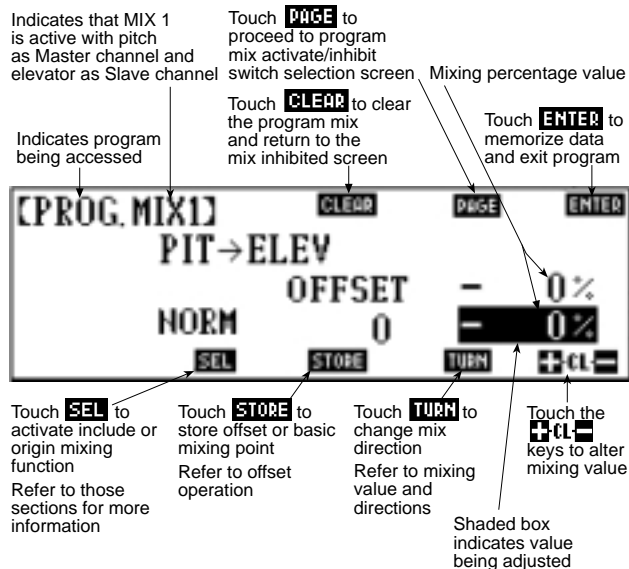
After the Master and Slave channels have been selected, touch the ENTER key to advance to the next screen. Using our example, the screen will appear as follows:



If the YES key is pressed, all servos hold their current position while you are adjusting the programmable mix.

If the NO key is selected, all servos remain active.

Note: If the throttle is selected as a Master or Slave channel in programmable mixing, it is highly suggested that you select YES when the above screen appears to prevent injury and/or damage to your heli.



Mixing With Trim

Whenever the Master channel is aileron, elevator, or rudder, you have the option of allowing the Master channel's trim lever to mix into the Slave channel. To activate the trim mixing, touch the

SEL key. The screen shows that this has been activated by displaying "ON" below trim. You can observe the operation by watching the Slave channel while moving the Master channel's trim lever.

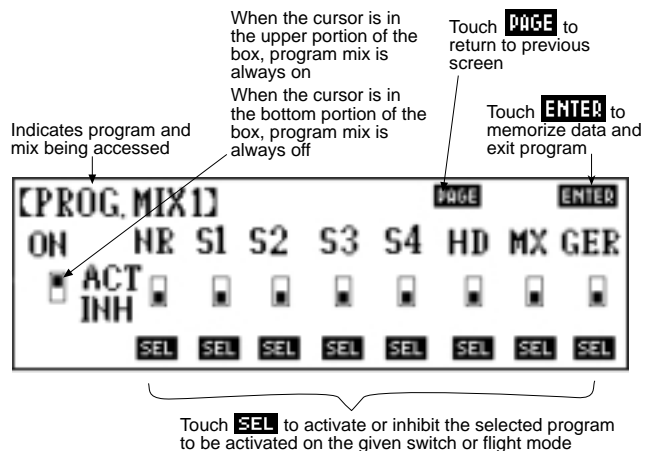
Note: If you have not yet entered values for the mixing percentages, the Slave channel will remain stationary. Also, if the mixing percentages are minute, the movement of the Slave channel from the trim lever will be also be minute.

Note: The Stunt Trim (Code 25), Trim Offset (Code 82) and Trim Rate (Code 83) functions all interact accordingly with the trim lever mixing.

Operation With a Switch

You are given the option of allowing each of the four (4) standard programmable mixes to be turned on and off in Normal flight mode position, and Flight Modes 1, 2, 3, and 4 with the throttle hold switch, the gear switch, or any combination of the above.

To select the switch or switches you desire to activate the programmable mixing, first touch the PAGE key and the screen below will appear:



Programmable mixing can be turned on with one or more of the following switch positions:

- | | |
|-------------------------------|--------------------------|
| NR: Normal Flight Mode | S4: Flight Mode 4 |
| S1: Flight Mode 1 | HD: Throttle Hold |
| S2: Flight Mode 2 | MX: Mix Switch |
| S3: Flight Mode 3 | GER: Gear Switch |

Touch the SEL key below the desired switch to move the cursor to the upper portion of the box, which indicates that the switch will now activate the respective programmable mix from the previous page.

Note: When the cursor is in the upper section of the ON box on the left-hand side of the screen, the respective programmable mix is always on.

Offset Operation

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

The reference point is the position of the Master channel stick, or control switch, or lever where you select the mix value as well as the direction of the mix. Using our example, PIT → ELEV mix, the offset point is the center position of the pitch control stick.

To select the offset value, position the Master control stick, switch lever, or potentiometer to the point you want as the offset position. Next, touch the STORE key located beneath the offset display. The offset value from center now replaces the 0 on the screen. This value may be either a positive number or a negative number, depending on the position of the master channel.

Note: The mixing value at the offset point is zero (0).

Mixing Value

Use the Master channel to change the location of the shaded box. In our example, moving the pitch stick downward shades the lower box; moving the pitch stick upward shades the upper box.

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

Note: Refer to the mixing direction for information on how to achieve a negative mixing percentage.

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

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

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

Mixing Direction

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

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

After all directions, values, switch operations, etc. have been selected and adjusted properly, you can proceed to the Include Mix or Origin Mix operations. To do so, touch the SEL key in the lower middle of the LCD screen.

Origin Mixing Function

When NORM is selected in the programmable mixing screen (bottom center of the screen), the mixing rate of the Master channel to the Slave channel is affected by the dual rates. For example, when switching to a lower rate on the Master channel, the mixing to the Slave channel is also reduced in direct proportion.

If ORIG (origin) is selected (lower middle of the screen), the percentage of mix is based on the values set in the travel adjust and is not affected by dual rate or exponential rate adjustments in Code 13, Dual Rates and Exponential function.

To select Origin Mixing, press the SEL key until ORIG appears. Now Origin Mixing will be on in the selected program mix only.

Set Up Tips

In fast forward flight, most helicopters slightly pitch nose up. Experienced pilots counteract this with forward stunt trim in Idle Up 1 and 2. However, at moderate forward flight speeds (e.g., 70% stick position), less forward flight trim is needed. Some top level pilots mix a slight amount of forward cycle to their throttle. As throttle is reduced, so is the amount of forward stunt trim, thus eliminating any pitching tendencies at all forward flight speeds.

Operating the Include Mixing Function

The Include Mixing function allows other programmed mixing values for the Master channel to mix into this program's Master channel.

Include Mixing, originally designed for use in aircraft program mixing, offers little benefit with most common types of helicopter program mixes and is therefore rarely used. Include Mixing, if used, should be tested carefully to insure that it does not create any unwanted mixing tendencies.

Functions Related to Mixing

The following are functions that are related to the master channel's operating value:

Throttle	Operating the throttle curve and throttle hold
Rudder, Elevator, Aileron	Adjustment of dual rate, expo, etc.
Retract Gear	Operating landing gear switch
Pitch	Adjusting pitch curve
AUX 2 & 3	Operating all switches
AUX 4 & 5	Operating all potentiometers

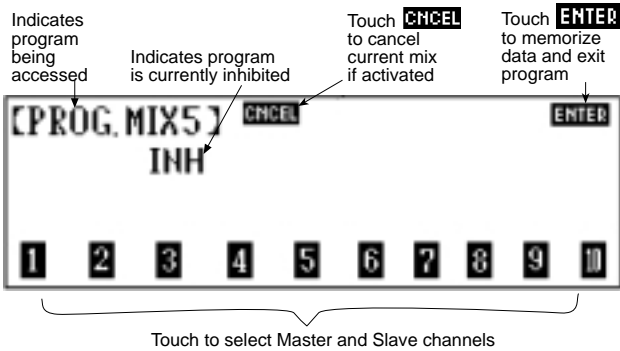
Multi-Point Programmable Mixing

The PCM10X offers four multi-point programmable mixes. These mixes allow the response curve of the slave channel to be manipulated at up to 8 points that you can freely select. Plus each of these mixes can be turned on/off in any of the eight possible flight conditions, N, 1, 2, 3, 4, HD, MX, or with the gear switch.

You will find programming the multi-point programmable mixes very similar to programming throttle curve, Code 18, and pitch curve, Code 68.

Accessing and Utilizing the Multi-Point Programmable Mixing Function

To access the Multi-Point Programmable Mixing function, enter the proper code, 55-58, in the code number access selection or using the direct mode method. The screen will appear as follows:



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

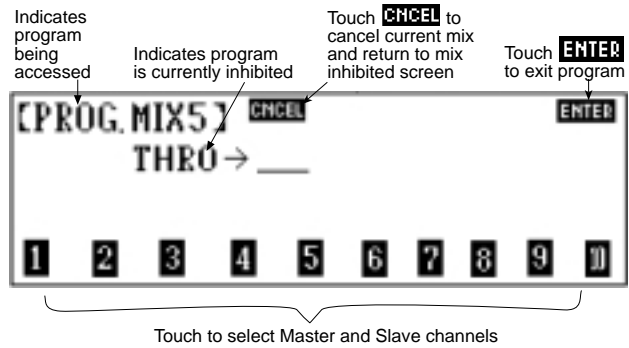
Each channel or your transmitter and receiver has been assigned a number for identification purposes. Use the chart below to identify the channel and its identification number.

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

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

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

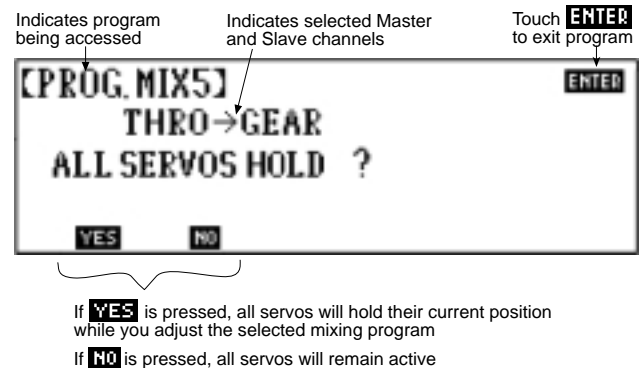
For example, you want to mix the throttle channel to the gear channel to allow the use of an active mixture control carburetor, the throttle is the Master, or controlling, channel. Gear is the Slave, or controlled, channel. The initial screen shows that the mixing feature is inhibited. However, after throttle is selected, the screen will appear as follows:



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

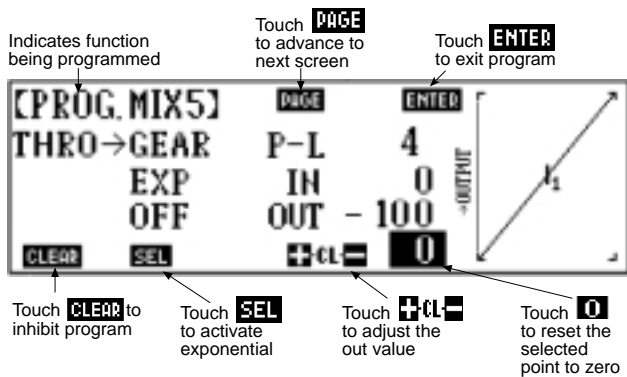
Note: Once both the Master and the Slave channel have been selected, the channel numbers are removed from the bottom of the screen. If you have mistakenly entered a wrong channel number for either the Master or the Slave channels, touch the CANCEL key to cancel the mix and reprogram the mixing channels.

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



If YES is pressed, all servos will hold their current position. If NO is pressed, all servos will remain active.

Your screen will now appear as follows:



Adjusting Multi-Point Programmable Mixing is very similar to adjusting the pitch and throttle curves. By moving your Master channel's stick position the position of the vertical line on the graph at the right of your screen can be moved. Whenever STORE appears at the bottom center of your screen, an additional point can be located at this position.

In & Out

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

If you press the 0 key, the Out position will be reset to zero and no mixing will take place at that selected point.

Stick Position

This value is represented numerically just below the ENTER key and changes to show the current stick position. You may find this useful when you want to move to the middle point position.

Stick Movement

Changes to the point setting can be made by moving the throttle stick to the desired position (indicated by the vertical line on the graphic display) and then adding or canceling. See the sections “Adding New Points” and/or “Clear Operations” respectively.

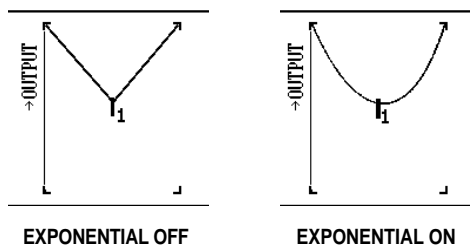
Adding New Points

Anytime the +, CL, - keys are replaced by the STORE key on the LCD, you can set a new point on the throttle curve. To do so, simply touch the STORE key. The PCM10X allows you to program two additional points to the right and two additional points to the left of the center of your graph. There are also a high and low point that are automatically entered into your transmitter.

Exponential Function

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

Example screens:



Clear Operations

When the display indicates the Master channel has achieved the desired point setting on the LCD screen, you can either press the + and - keys simultaneously or press the CL key to clear the desired point.

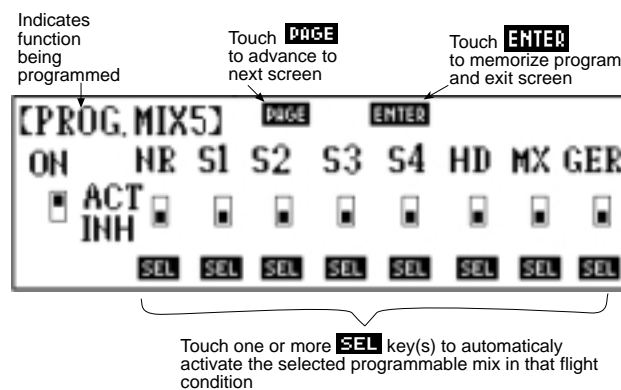
Note: Only that point will be cleared from the transmitter. As a result of removing one point, the other point numbers change accordingly. Their values do not change, only their point numbers. Their location on the curve remains the same regardless.

- Point L:** Preset to 0
- Point H:** Preset to 100
- Middle Point:** Cancels middle point

Multi-Point Programmable Mix Switch Selection

Multi-Point Programmable Mixing, Codes 55-58, can be turned off and on automatically in one or more of the following flight modes: Normal, Stunt 1, Stunt 2, Stunt 3, Stunt 4, Hold, or on the mix switch. Or it can be programmed to always be on.

Once the above mixing is completed, touch the PAGE key and the screen will appear as follows:



Note: When accessing this screen, the selected programmable mix is programmed to be on at all times as indicated by the ON located on the left-hand side of the screen with the shaded area in the upper portion of the box.

To activate the selected programmable mix in any of one or more desired flight modes, press the SEL below the respective flight mode and note that the shaded area of the box below that flight mode will move from the lower position to the upper position indicating that that mix will be automatically turned on in that flight mode.

Operating the Origin Mixing Function

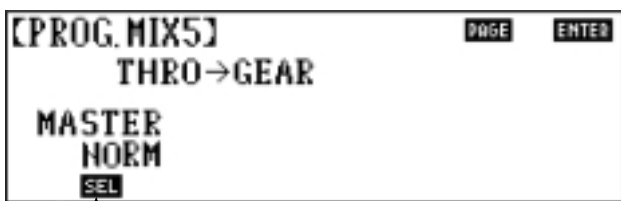
When NORM is selected in the programmable mixing master screen (bottom left of the screen), the mixing rate of the Master channel to the Slave channel is affected by the dual rates. For example, when switching to a lower rate on the Master channel, the mixing to the Slave channel is also reduced in direct proportion.

If ORIG (origin) is selected (lower left of the screen), the percentage of mix is based on the values set in the travel adjust and is not affected by dual rate or exponential rate adjustments in Code 13, Dual Rates and Exponential function.

To select Origin Mixing, press the SEL key until ORIG appears. Now Origin Mixing will be on in the selected program mix only.

Operating the Include Mixing Function

After accessing the mix switch selection screen, touch the PAGE key to access the Include Mixing program. Your screen will appear as follows:



Touch **SEL** to activate the Include Mixing or Origin Mixing functions

This feature allows other programmed mixing values for the Master channel to mix into this program's Master channel.

Include Mixing, originally designed for use in aircraft program mixing, offers little benefit with most common types of helicopter program mixes and is therefore rarely used. Include Mixing, if used, should be tested carefully to insure that it does not create any unwanted mixing tendencies. Include Mixing can be helpful in some cases during program mix adjustment as, when activated, it will allow the graph's cursor bar to move to the extreme left and right of the graph, regardless of the ATV's dual rate and throttle/pitch values selected for the channel to be mixed. If used in this fashion, remember to change the mix type back to either normal or origin mixing prior to flight.

Swashplate Mixing/Type

The Swashplate Mixing/Type function was created to ease in flight trimming of the helicopter (swashplate timing) and to also allow the PCM10X system to be used in models incorporating a 120° or 140° cyclic/collective pitch mixing system (CCPM). CCPM is a type of pitch mixing where the servos are connected directly to the swashplate and physically move the swashplate for all changes in pitch. The transmitter allows you to choose between two swash types:

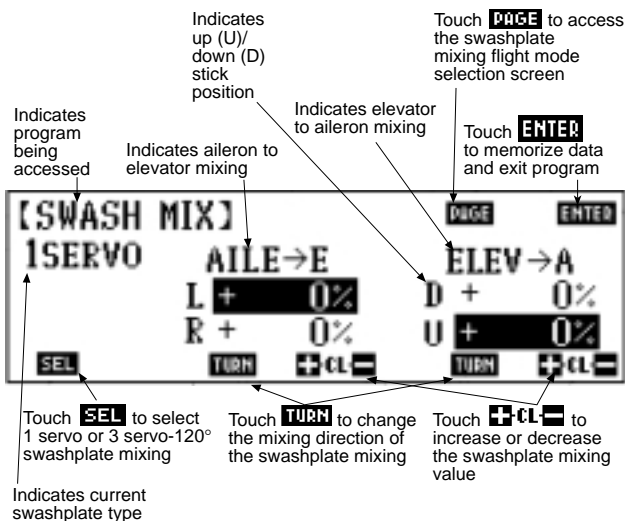
1 Servo — The most popular swash mixing in the United States. This style has only one servo to move the swashplate for pitch changes. In this mode, a Swashplate Timing function is also available.

3 servo-120° CCPM — This system also uses three servos for swashplate movement in this selection. However, they are spaced 120° apart. Refer to the diagram on the following page for clarification.

3 Servo-140° CCPM — This version of CCPM mixing is very similar to the previous 120° CCPM and also uses 3 servos for swashplate movement, but they are spaced 140° apart. This unique form of CCPM mixing is currently under development by JR for future release. At the time of this writing there are currently no models available that utilize this form of CCPM. Watch for future JR heli kit releases that utilize this new form of CCPM.

Accessing and Utilizing the Swashplate Mixing Function

To access the swashplate Mixing function, enter Code 65 at the code number access selection or use the direct mode method. The display will read as follows:



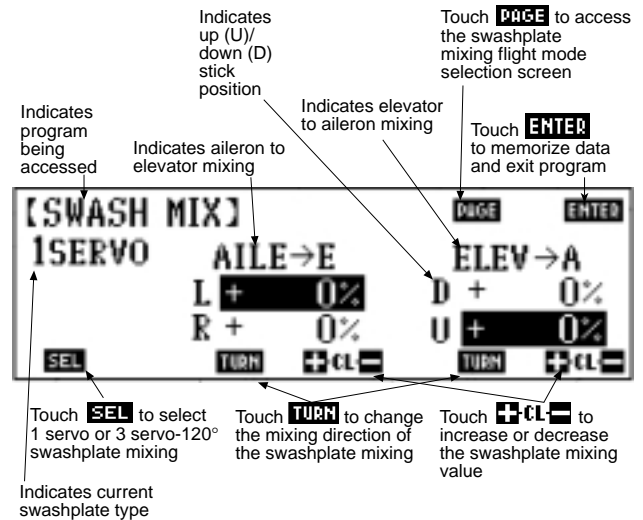
1 Servo Swash Type

Use this swash type with the normal style linkages.

In this swashplate selection, use one servo for your swashplate or pitch movements.

Swashplate Timing

In the swash type feature when one servo is selected, the screen will appear as follows:

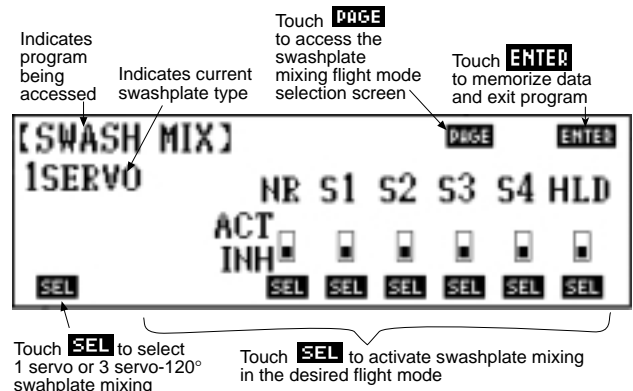


Swashplate timing is used to correct elevator-to-aileron and also aileron-to-elevator coupling. One method for checking for elevator-to-aileron coupling is to do a loop and note if the helicopter tracks straight, or has a tendency to roll to the right or left. If the loop is viewed from the end (in line), elevator-to-aileron coupling would appear as a corkscrew.

To correct this, feed in the correct amount of opposite swashplate timing. For example, if the corkscrew is to the helicopter's left, feed in right timing.

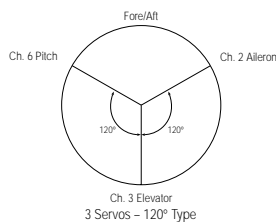
Note: To determine the direction, hold full back aileron stick and touch the + or - keys noting the direction the aileron servo tilts the swashplate.

To access the Flight Mode Selection screen, touch PAGE once.



Press the SEL key below the appropriate flight conditions — NR S1, S2, S3, S4, HLD — to activate swashplate timing in that flight condition.

3 Servos (120 degrees) CCPM Mixing



To access this swashplate selection, touch the SEL key once.

The screen will appear as follows:

Indicates program being accessed

Indicates current swashplate type

Touch **ENTER** to memorize data and exit program

Touch **SEL** to return swashplate mixing to 1 servo type

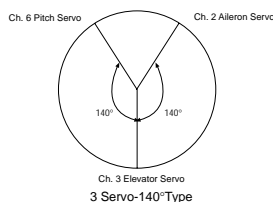
Touch the **ACT** to activate/inhibit exponential

Touch the **+** key to increase travel value of respective channel

Touch the **-** key to decrease travel value of the respective channel

Touch the **+** and **-** keys simultaneously, or the CL key to reset the value to the factory default

3 Servo (140 Degree) CCPM Mixing



To access this swashplate selection, touch the SEL key once. The screen will appear as follows:

Indicates program being accessed

Indicates current swashplate type

Touch **ENTER** to memorize data and exit program

Touch **SEL** to return swashplate mixing to 1 servo type

Touch the **ACT** to activate/inhibit exponential

Touch the **+** key to increase travel value of respective channel

Touch the **-** key to decrease travel value of the respective channel

Touch the **+** and **-** keys simultaneously, or the CL key to reset the value to the factory default

When a collective input is made, the elevator, aileron and pitch servos all move in unison to raise or lower the swashplate.

When an aileron input is given, the aileron and pitch servos move in opposite directions to tilt the swashplate left or right. The elevator servo remains stationary.

When an elevator input is given, the elevator and pitch servo move in the same direction, while the aileron servo move in the opposite direction.

The travel values for each of the three channels are +/-100% and are advanced individually for each channel.

To clear the input values, touch the CL key or the + and - keys simultaneously. The cleared value assumes 0%. However, if Code 28, Data Reset, is used to clear the values, the values return to 60%.

Note: The swash type selection also returns to the 1 servo swash type selection.

For adjustment suggestions, refer to the Adjustment Step Section that follows this section.

3 Servo (120° and 140°) CCPM Mixing Adjustment Step Section

1. All programs must be returned to their default or factory preset values. The fastest way to accomplish this is with the Data Reset function, Code 28. You also need to bring the aileron, elevator and hovering pitch knobs to their neutral positions. Failure to bring all settings, knobs, and trims to their neutral positions may cause misalignment in the swashplate control.
2. Select the proper swashplate type for your helicopter. For information on swashplate type selection, refer to the section entitled "Accessing and Utilizing the Swash Type Feature." Adjust your servos for the proper travel direction with the Reversing Switch function, Code 11.
3. With all of the swashplate servos in their neutral positions, use the Sub-Trim function, Code 15, to bring each servo's control arm to 90 degrees to the control linkages. The swashplate must be level at this time.
4. When making pitch changes, it is important that all servos move an equal amount in order to keep the swashplate level throughout the entire pitch range. You must compensate for any difference in the unequal throw of the servos by using Code 12, Travel Adjust, and making precise adjustments to the end points of the servo's travel.
5. Move the aileron and elevator sticks and observe their travel directions. If one of these channels is moving in the wrong direction, set the operating value to the negative (-) side by touching the CL on the display screen to bring the value to 0%. Then touch the - key until you reach the desired travel amount. Alternatively, just touch the - key until the value reaches the negative value you desire. Please note that this second method takes slightly longer.
6. Now adjust each stick's operational value. The adjustable range is +/-100%.

Note: It is possible to adjust to too large a value and exceed the servo's maximum throw angle. If this occurs, you have to make mechanical adjustments to correct for this situation.

After completing the adjustment steps, proceed to make the normal adjustments to the pitch curves, throttle curves dual rates, etc.

Additional Functions

To eliminate any mechanical differential error caused by the servo control arms, you can alter the Travel Adjust values (Code12) for each of the three servos as needed to remove any unwanted mechanical interactions.

Pitch Curve Function

The Pitch Curve function operates in the same manner as the Throttle Curve function, Code 18, except that all input values correspond to the pitch, or collective, of your helicopter. Please study and understand the Throttle Curve function prior to adjusting your pitch curves. This is important because both the throttle and the pitch servos are operated from the throttle (collective) stick.

Note: In Code 17, Function Select, if the pitch trim levers have been activated, you will see their effects during this program. Please refer to the Pitch Trim Lever Section which follows for a further explanation.

There are six (6) different pitch curve settings available.

N-Normal	For hovering and normal forward flight.
1	Commonly used for high speed forward flight or aerobatic maneuvers.
2	Used for aerobatic maneuvers or switchless inverted flight.
3	Used for aerobatic maneuvers or switchless inverted flight.
4	Used for aerobatic maneuvers or switchless inverted flight.
H-Throttle Hold	Used when the throttle hold switch has been activated and on for practicing autorotations.

Note: Throttle hold flight curve settings must be programmed if this function is activated.

Prior to accessing and using the pitch curve functions, we will discuss the features common to all six pitch curves.

Features Common to All 6 Pitch Curves:

Graphic Pitch Curve

On the right side of the LCD screen, there is a graphic depiction of the current pitch curve. On this curve is a cursor and vertical line that corresponds to the throttle/collective stick position at any given time. If the stick is in its lowest position, the cursor and vertical line will be in the lower left side of the graph. If the stick is at its highest position, the cursor and vertical line will be located in the upper right side of the graph. The cursor and vertical line also serve to indicate the point where you are in the pitch curve. The graph itself will change in relation to the inputs that you'll be entering shortly.

Switch Position Indicator

This displays the position of the flight mode switch and the throttle hold switch.

Representations are as follows:

- N Normal Flight Mode
- 1 Stunt 1 Flight Mode
- 2 Stunt 2 Flight Mode
- 3 Stunt 3 Flight Mode
- 4 Stunt 4 Flight Mode
- H Throttle Hold Flight Mode

In and Out Values

IN – This can be thought of as the stick position value. In other words, this is the actual value of the stick itself. For example, if the IN value is at 50%, then you have moved the internal portion of the stick 50% of its travel.

OUT – This can be thought of as the point position value. It may be easier to think of it as the actual value for the collective servo. For example, if the OUT value is 90%, then the servo has moved to its 90% position.

Stick Movement

Changes to the point setting display can be made by moving the throttle/collective stick to the desired position (indicated by the cursor and vertical line on the graphic pitch curve display) and then either adding or clearing the point as desired.

Note: The stick position display and output value display can be adjusted from 0–100.

Adding New Points to the Pitch Curve

You can store up to six (6) points to each of the pitch curves, not including the low and high pitch points. This allows a total of eight (8) points along each of the pitch curves.

You can store a point on the pitch curve anytime the STORE key appears below the IN and OUT values. To modify the point position value, refer to the changing point value section that follows.

Clearing/Canceling Points on the Pitch Curve

When the display shows the throttle/collective stick achieving the desired point setting on the screen, touch the CL KEY or press the + and - keys simultaneously. Only that point will be cleared from the pitch curve.

Note: When you remove a point from the pitch curve, point numbers change accordingly. However, their location remains the same. For example, point 1 value 15, point 2 value 29, point 3 value 44. If point 2 were removed, point 3 would be re-numbered point 2, yet its value would still be 44.

Point L

Preset to 0. When the low pitch trim lever is activated, Code 17, Function Select, return the lever to the low position.

Point H

Preset to 100. When the high pitch trim lever is activated, Code 17, Function Select, return the lever to the low position.

Changing Point Values on the Pitch Curve

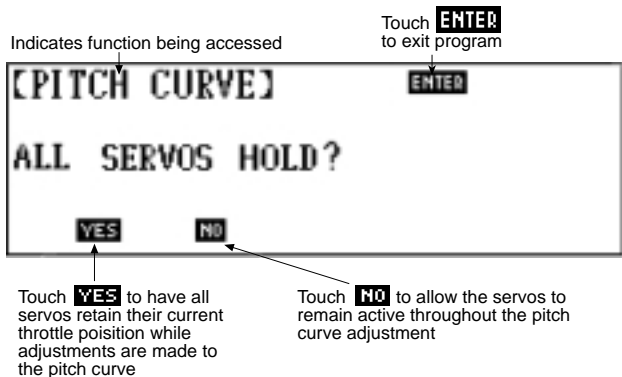
To make access easier, after you have already set a point and wish to change its value, the graphic display indicates the stick position relative to the point. Even if you are not exactly on the precise point location when you do change the value, the point position will not be changed by mistake. Only the point value itself will change. In other words, if you want to change the output value for point 2 on the pitch curve, simply move the throttle/collective stick until 2 appears next to the point indicator. Once the desired point number, 2 in our example, is visible, touch the + key to increase output value (up to 100) or the - key to decrease output value (down to 0).

Note: At this point, it is imperative that you have a thorough understanding of these common pitch curve features. These features enable you to properly adjust the pitch curves for your R/C helicopter. The pitch curve, in turn, is one of the most important aspects in the flying of your helicopter.

Accessing and Utilizing the Pitch Curve Function

To access the Pitch Curve function, enter Code 68 at the code number access selection or use the direct mode method.

The display will appear as follows:

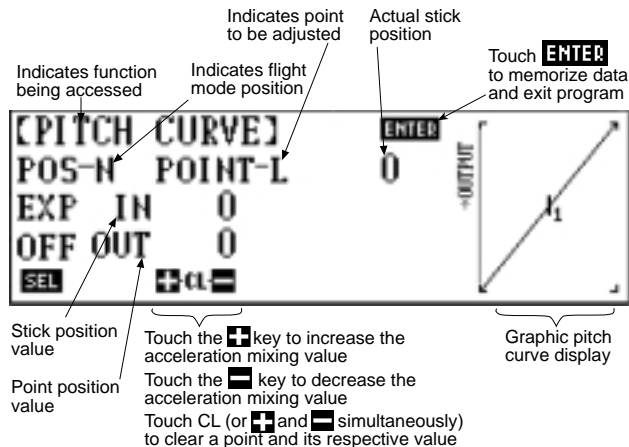


After you have made your selection, the transmitter automatically proceeds to the next LCD display in the pitch curve selection. The actual screen display will vary and is dependent upon the flight mode switch position (N, 1, 2, 3, 4), the throttle hold switch position (if active), and the inverted flight switch position (if active).

Normal Pitch Curve

This should be the first pitch curve you set up for your helicopter. To do so, return the throttle/collective stick to its low position, place the flight mode switch to the N, or normal, position and return the throttle hold switch to the off position, if activated.

The screen will appear as follows:

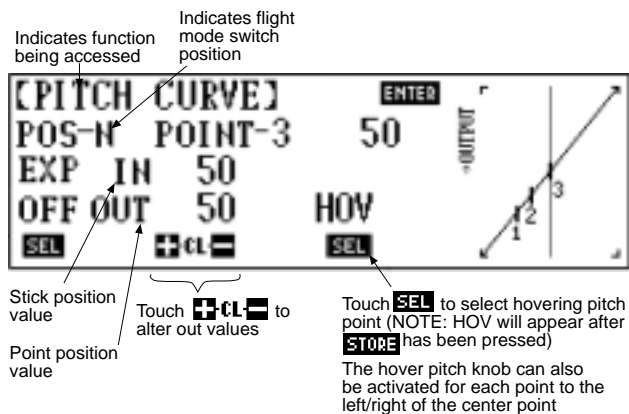


In the normal flight mode switch position, you can program up to eight pitch points. Although the high (H) and low (L) IN values are not selectable, the OUT values can be adjusted to suit your flying style. This gives you up to eight (8) pitch points, as mentioned earlier.

Note: If in Code 17, Function Select, you have activated the trim levers, they will affect their respective pitch points at this time. The low pitch trim lever affects the pitch curve from the low point up to the first pitch point, point 1. The high pitch trim lever affects the pitch curve from the last programmed point to the high point. Their effective trim rate is approximately +/-10 on the curve. For further explanation, refer to Code 17, Function Select.

Hovering Pitch Point

You can select a hovering pitch point when the SEL key appears on the screen. The screen will appear as follows:



The importance of selecting a hovering pitch point will become apparent in the following Hovering Pitch Knob section.

Hovering Pitch Knob

The hovering pitch knob is used to alter the hovering pitch curve by approximately +/-10 at the hovering position. This, in turn, compensates for either an overspeeding or underspeeding rotor rpm at the hover. The hovering pitch knob is only operable when the flight mode switch is in the normal position and only affects the hovering pitch of your helicopter. You can observe the operation of the hover pitch knob on the LCD display.

The hovering pitch knob can also be activated to alter the position of any points established directly to the left or the right of the center stick position point. This is very helpful as it allows the pilot to increase/decrease the pitch values over the entire hover range to adjust the main rotor speed, without affecting pitch sensitivity.

If a point is eligible for pitch knob selection, SEL will appear at the lower center portion of the screen. Press SEL and HOV will appear, indicating that this point will now move with the hovering pitch knob.

After completing the pitch curve for the normal flight mode switch position, you can either exit the Pitch Curve function or proceed to program the next pitch curve. At this time, please refer to the appropriate section below.

Exiting the Pitch Curve Function

You may exit the pitch curve function at any time by pressing the ENTER key. Your pitch curve(s) will automatically be memorized by your PCM10X transmitter at this time.

Note: If you touch the ENTER key and you had answered YES when asked “All Servos Hold?”, you must return the throttle/collective stick to the low position and the flight mode switch to normal due to the safety feature. The LCD displays the following warning if the stick is not in the low position: “Move Thro Stick Low Position, Flight Mode Norm Position!” Once you return the throttle/collective stick to the low position, your transmitter resumes normal operation.

Note: If you selected NO when asked “All Servos Hold?”, normal operation will resume immediately after you press the ENTER key.

Programming Another Pitch Curve

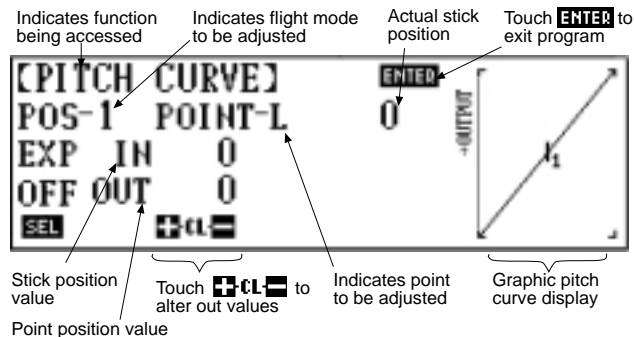
The next pitch curve you program is a matter of personal preference. Most pilots program Stunt 1, Stunt 2, Stunt 3 and Stunt 4 and then proceed to the throttle hold pitch curve.

To select another pitch curve, simply move the appropriate flight mode switch to its active position. For example, we have just finished programming the normal flight mode pitch curve and now want to access the stunt 1 pitch curve. Move the flight mode switch from position N to position 1. The LCD display changes accordingly. You can observe the pitch curve change by watching the POS and graphic pitch curve position of the LCD display. To activate Flight Modes 3 and 4, see Code 17, Function Select.

Stunt 1, Stunt 2, Stunt 3, Stunt 4

These pitch curve selections refer to positions 1, 2, 3 and 4 on your flight mode switches. Therefore, you must place the flight mode switches to the position relative to your next curve selection. In other words, place the switch to position 1 for Stunt 1 pitch curve and position 2 for the Stunt 2 pitch curve, etc.

The screen will appear as follows:



Note: For a complete description of this screen refer to the normal flight mode pitch screen. Select the pitch curve points for Stunt 1, 2, 3 and 4 in the same manner as you have done for the normal flight mode pitch curve.

Note: You will not select a hovering point in either the Stunt 1, Stunt 2, Stunt 3 or Stunt 4 flight modes.

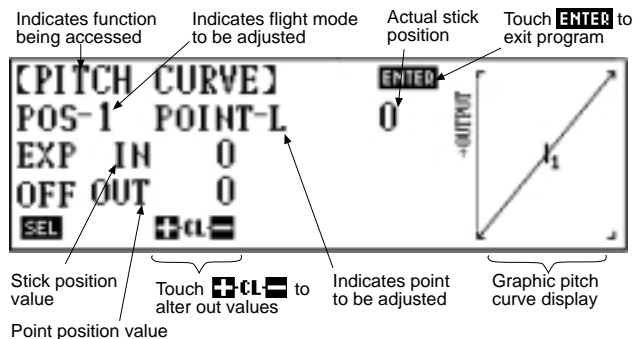
Note: If in Code 17, Function Select, you have activated the trim levers, they will continue to affect the low and high pitch trims as they did in the normal flight mode pitch curve.

Note: To activate Flight Modes 3 and 4, see Code 17, Function Select.

Throttle Hold Pitch Curve

The PCM10X also allows for a separate pitch curve for the throttle hold switch. In order to access the pitch curve for the throttle hold switch, the switch must be activated. You can check to see if the throttle hold switch is activated by placing it in the “on” position — i.e, move the switch toward the face of the transmitter. If it is active, the screen will change accordingly. If not, you need to activate the switch at this time. To do so, refer to Code 16, Throttle Hold, in Section 8.5 of this manual.

Once the switch is active, place it in the “on” position. Your screen will display:



Note: For a complete description of this screen refer to the normal flight mode pitch screen.

Select the pitch curve points for the throttle hold switch in the same manner as you did the normal and stunt flight mode pitch curves.

Note: Again, you will not select a hovering point in the throttle hold flight mode.

Note: If in Code 17, Function Select, the trim levers have been activated, they will continue to affect the low and high pitch trims, as they did in the other flight mode switch positions.

Exponential (EXP)

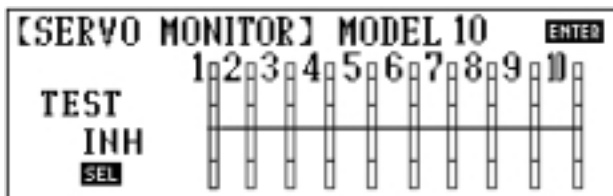
An Exponential function is available on the pitch and throttle curves. This function “smoothes out” the curve, eliminating abrupt response changes. To activate this function, press SEL below the EXP on the lower left-hand side of the screen. EXP must be turned on or off for each of the available pitch and throttle curves independently by accessing the desired screen (e.g., N, 1, 2, 3, 4, HD).

Servo Monitor

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

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

The screen will appear as follows:



Servo Test (Slow/Step)

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

Accessing and Utilizing the Servo Test Function

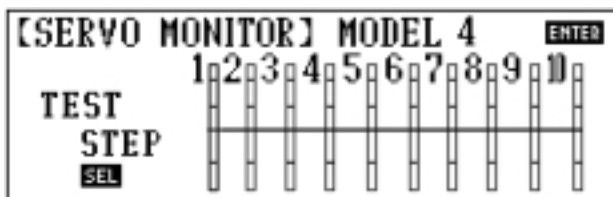
First, it is a good idea to remove all linkages from the servos in your helicopter. This enables the servo to travel its full range without any mechanical binding that could harm the servo and/or helicopter.

After this has been completed, access the Servo Monitor function. To do so, enter Code 75 at the code number access selection or use the direct mode method.

Slow Servo Monitor

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

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



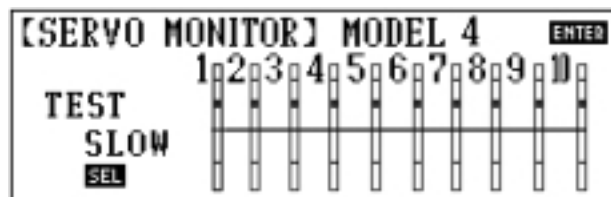
Observe each respective servo in your model for signs of unusual wear. Note that a servo with either a worn or bad potentiometer will jump or "jitter" as it moves across the weak area.

Note: The radio indicates accumulated time of use for each particular model number on the right side of the LCD. If you use a particular helicopter in more than one memory of your transmitter, you must add both of the accumulated times together to achieve an accurate figure for accumulated time on these particular servos. Also, if Code 28, Data Reset, has been used, the accumulated time will reset along with all the other functions.

Step Servo Monitor

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

Your screen will change to display the following:



Note: The servos now move one at a time through the step test mode. The feature begins with channel 1 (the throttle channel) and moves to channel 2, then channel 3 and so on. Each servo moves through four steps before going to the next servo.

Note: The PCM10X tests all channels, not just the ones you are using on your model. Therefore, you might notice a delay between servo testing. If AUX1 is the last channel used, there will be a delay of approximately 5–8 seconds before the throttle channel begins its step testing.

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

Fail-Safe/Hold

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

Note: In the PCM modulations, the Fail-Safe and Hold features cannot be totally disabled, so that the servos will react to interference in the same way as they do in a PPM system. This is only possible with the use of a PPM receiver and the transmitter in the PPM modulation. Please refer to Code 85, Modulation, for more information pertaining to the broadcast signal of your PCM10X helicopter radio.

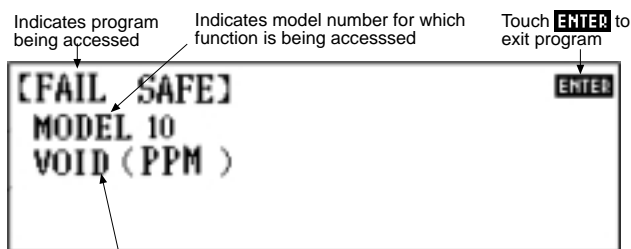
Accessing and Utilizing the Fail-Safe/Hold Function

To access the Fail-Safe/Hold function, enter Code 77 at the code number access selection or use the direct mode method.

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

PPM

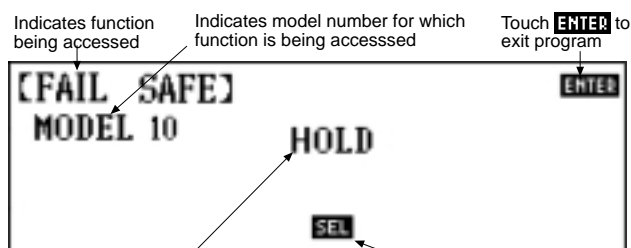
As noted earlier, if you are in the PPM modulation, the Fail-Safe/Hold function is not applicable. The screen will appear as follows:



Indicates that the Fail-Safe/Hold function is void due to the PPM modulation

ZPCM Fail-Safe/Hold

The initial screen will appear as follows:



Indicates that, should interference occur, the servos would hold their last position prior to the interference

Hold

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

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

Fail-Safe

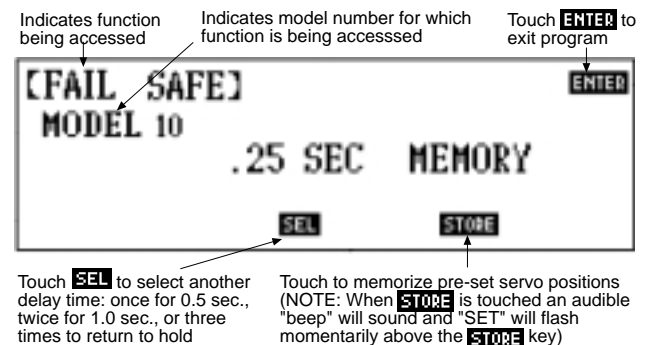
Note: Fail-safe should always be set when the helicopter is not running.

When the Fail-Safe function is activated and the signal is interrupted, the transmitter automatically moves each servo to a pre-set position. The position that each servo assumes is determined by you, as is the time length of the interference that must occur before servo movement.

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

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

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



The first time delay that appears is the .25 sec delay. If you want to select the 0.5 sec delay, simply touch the SEL key one time. If you desire a 1.0 sec delay before the servos assume their preset positions, touch the SEL key one more time.

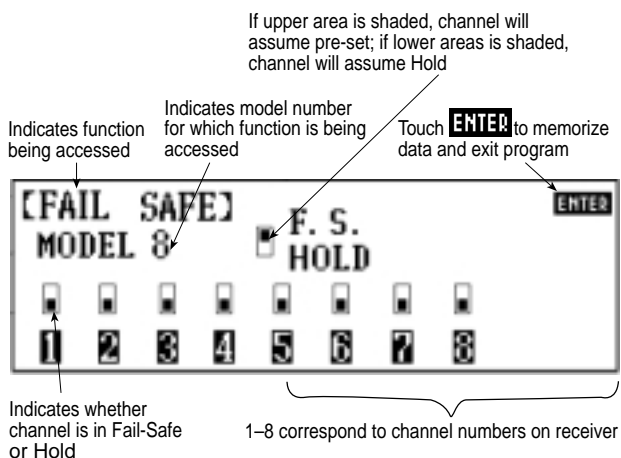
Note: Your time delay changes accordingly to verify the input.

To enter the preset servo positions you want, simply hold the sticks in the positions you want the servos to assume during signal loss conditions. You can determine fail-safe preset positions for the other channels of your helicopter by placing the potentiometers and switch in the positions that you want them to assume during interference. Next, touch the STORE key. While the STORE key is depressed, an audible beep sounds and SET flashes momentarily on the LCD display above the STORE key. Those stick, potentiometer and switch positions are now stored in the transmitter's memory circuits, to be sent to the receiver's memory automatically.

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

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

SPCM Hold



The fail-safe in the SPCM offers three types of fail-safe: 1. hold, 2. fail-safe presets or 3. a combination of the first two.

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

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

SPCM Fail-Safe

Once the Fail-Safe function has been activated by signal interruption (interference), the transmitter automatically moves the servos to a preset position. The pre-determined servo positions are determined by you. In the SPCM fail-safe, the time delay (the amount of time it takes, starting the moment the interference occurs, until the servos assume the preset positions) is fixed at .25 or 1/4 second.

After the interference has ceased, normal operation of the helicopter returns to you immediately.

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

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

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

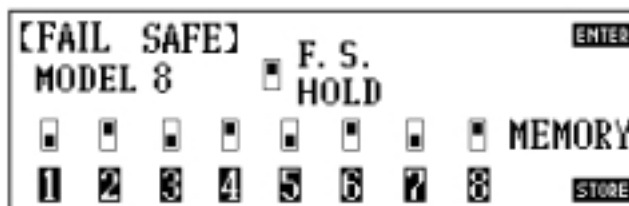
To verify the input of the fail-safe preset positions, turn the transmitter “off,” while leaving the receiver’s power on. Observe the reactions of the servos. They should assume the positions that you entered with the STORE key.

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

Combination Fail-Safe and Hold

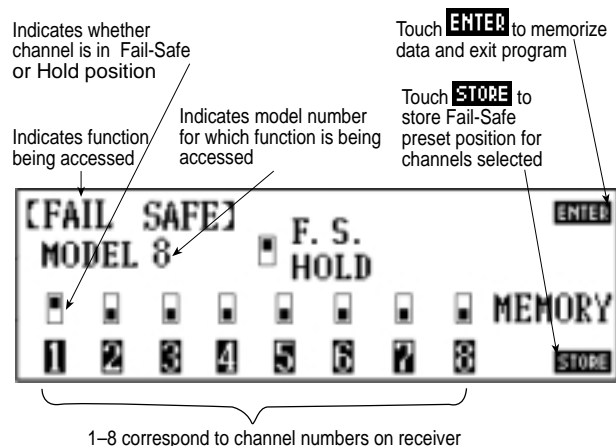
The PCM10X also allows you to combine the hold and fail-safe pre-sets for the first eight (8) channels on the receiver — you can select fail-safe or hold independently for channels 1–8 on the helicopter. In other words, some channels will hold their last clear signal position, while others assume a preset position.

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



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

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



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

To enter the preset servo positions you want, simply place the switches (referring to AUX 3 and retracts) and the gimbal sticks in the positions you want the servos to assume during signal loss conditions. Next, touch the STORE key that appears once any channel has been selected for fail-safe, instead of hold signal, position.

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

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

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

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

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

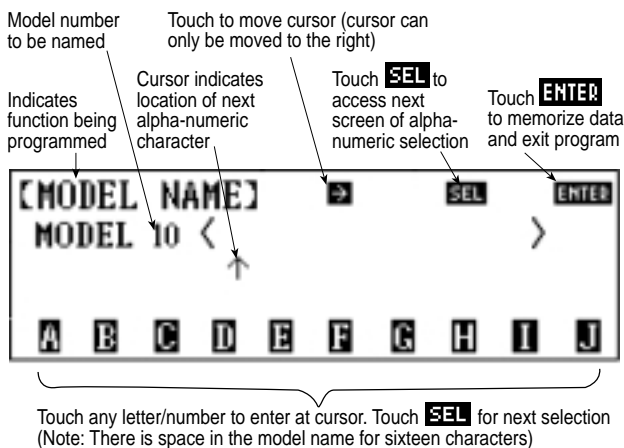
Model Name

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

Accessing and Utilizing the Model Name Function

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

Your screen will appear as follows:



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

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

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

Note: The cursor automatically moves to the next entry position.

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

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

Note: The model name (and frequency, if entered) appears on the initial screen each time the PCM10X is turned on.

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

Trim Offset

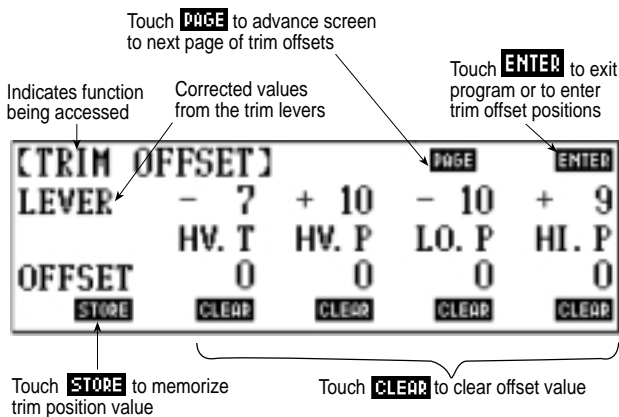
The trim offset function allows you to test fly your aircraft and correct for any built-in trim necessities. After you adjust the trim levers and pitch and throttle knobs during the test flight, the trim levers and pitch and throttle knobs may no longer be in their center or neutral positions. This function allows you to return them to their center or neutral positions without readjusting the linkages.

This function is very important when switching from model to model. By allowing your trims to remain in their neutral positions and still retain their corrections, you can easily switch among the ten (10) model memories without readjusting for each helicopter's flight tendencies.

Accessing and Utilizing the Trim Offset Function

First, test fly your R/C helicopter and use the trim levers to correct for any natural flight tendencies in hover. After all the corrections have been made, land your helicopter. Do not adjust any of the trim levers, nor the hovering throttle or hovering pitch potentiometers. Allow them to remain in their corrected positions.

Next, access the Trim Offset function by entering Code 82 at the code number access selection or use the direct mode method. The display will show:

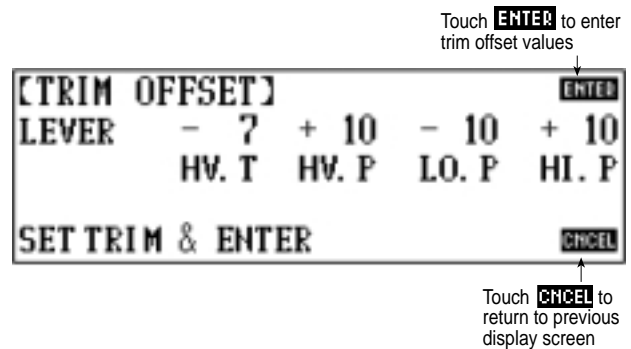


Note: The low pitch lever and high pitch lever will not appear unless they have been activated in Function Select, Code 17.

The corrected values above are only examples to show what your values may resemble.

- HTV The hovering throttle knob
- HVP The hovering pitch knob
- LOP Low pitch trim lever
- HIP High pitch trim lever

With the trim levers and potentiometers still in their corrected positions, touch the STORE key. The screen will change to display the following:



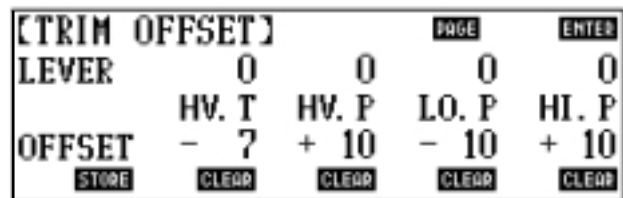
Note: All operations to the receiver cease during this screen display.

At this point, you should return the hovering throttle and hovering pitch potentiometers, as well as the low pitch and high pitch levers, to their neutral positions. When the trims reach their neutral positions, the corrected values are replaced by 0 on the LCD display.

When this has been completed, touch the ENTER key.

Note: The display returns to the original trim offset display, and all transmitter functions once again become operational, without disturbing the flight trim of the functions that you have just offset.

Your trim offset values are now memorized by the transmitter and are confirmed by their respective corrected values that appear above the CLEAR keys. In our example, the screen would appear as follows:



Note: You can clear any of the offset values to the zero point by touching the CLEAR key under the respective channel.

Note: The trim offset value has no effect on the curves you set in other programs. But, if you want to reset different curves, you may need to clear the offset trims first.

Note: If the trims are offset too far in one direction with this program, you get the message OVER appearing where the number value was on the screen. Touch CLEAR for that function and make adjustment to your model's control linkages. Also, if the trim offset is too large, you may run into a problem with the servo jamming into the end stop and stalling. Check your servo's maximum throws to be sure this condition does not exist. A stalled servo quickly drains your receiver battery pack. If your servo is stalled or it is close to being stalled or jammed, readjust the servo control linkages.

Digital Trims and Trim Rate Adjustment

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

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

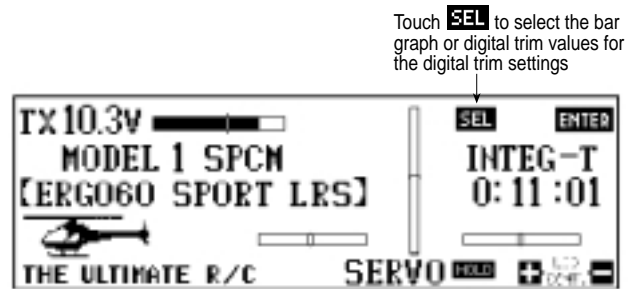
Note about mechanical throttle trim rate: *The mechanical throttle trim rate is adjustable from 0–100%. Adjustments made to the throttle trim rate affect both the total servo travel available with the throttle trim lever (approximately 0 to 30 degrees) and the servo travel between each click of trim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

Features of the digital trims:

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

Digital Trim Display

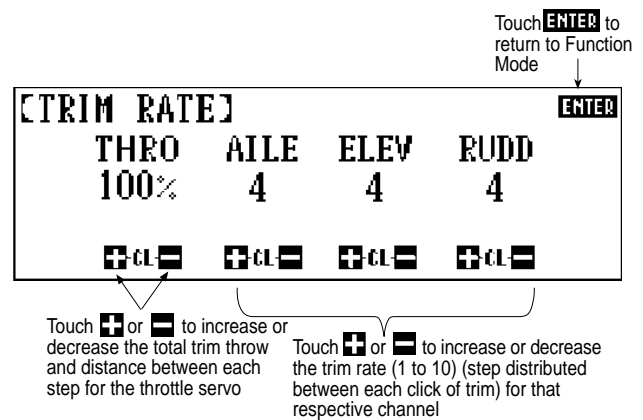
On the initial info screen, the trim position can be displayed on a bar graph or as a digital value for reference. To select the bar graph or digital trim values, touch the SEL key on the initial info screen (see below).



Accessing and Utilizing the Trim Rate Function

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

Your screen will appear as follows:



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

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

Flight Trimming with Digital Trims

As mentioned previously, the 10x's new 3+1 Digital Trim feature allows for individual trim settings for each of the 6 flight modes (Normal, Stunt 1–4, and Hold) to be accessed during flight and automatically stored.

This feature replaces the previous Code 25 Stunt Trim function found in the previous PCM10, 10S, 10SX, and 10SxII systems, and actually makes flight trimming easier than ever before.

With the previous Stunt Trim function, it was necessary to land the model each time a flight mode trim change was needed. This method, although accurate, took a considerable amount of flight time to accomplish.

The 10X's new Digital Trims allow for the trim levers to remain active in each flight mode so these separate trim values can be accessed at any time while in flight so even the most minor trim adjustments can be performed with ease. The pilot also has the option to inhibit the Digital Trims in all flight modes through the ADT function found in Code 17. This feature allows the pilot to make all needed trim changes in each flight mode, and then inhibit and store these trim values so that these trim values cannot be accidentally changed during flight. This feature is extremely helpful to the contest pilot who wants to insure that these trim settings are not accidentally moved during the heat of competition.

Another useful feature incorporated into the new 3+1 Digital Trims is the ability to view the actual trim values for each flight mode from the main screen while the heli remains at idle. This is possible by pressing the Servo Hold function located on the main screen. Please refer to Section 6.4 of this manual for more information.

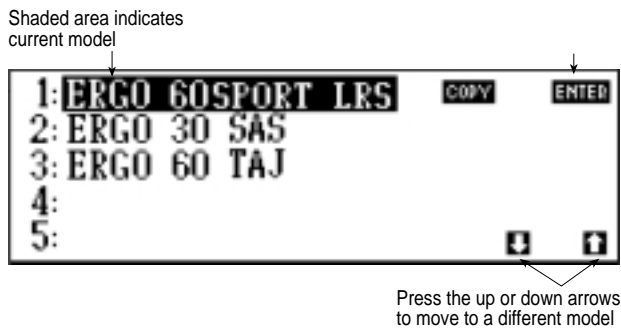
Model Selection

This transmitter allows you to program ten (10) different helicopter settings into its memory. It also allows you to copy the data from one helicopter program to another model memory. This feature permits you to select a given model or to copy to another model's memory.

Accessing and Utilizing the Model Select Function

To access the Model Select function, enter Code 84 in the code number access selection or use the direct mode method.

The screen will appear as follows:



Note: You cannot access the Model Select function once the battery voltage alarm has sounded. For more information on the battery voltage alarm, refer to Section 6.1 of this manual.



Model Selection

To exit the current model, simply touch the corresponding number of the model you wish to access. If the model has been named (see Code 81, Model Name), the name will appear beside the number.

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

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

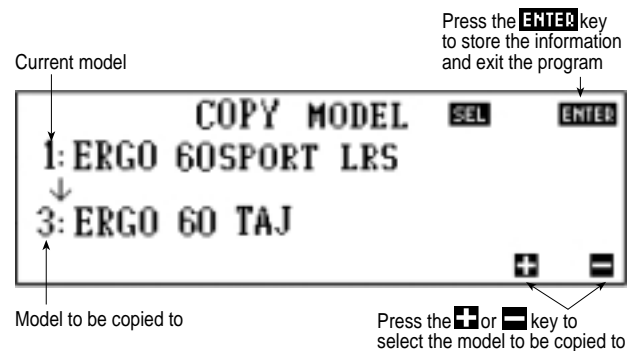
Copy Function

This function allows you to transfer all data from the model you have currently accessed to another model memory of your choice.

Note: This function is only for use when copying models from one model memory to another model memory within the same transmitter. To copy one of your model's settings into a different PCM10X helicopter radio, refer to Code 86, Data Transfer.

After accessing the Model Select function, select the model you want to copy the data from. To do so, refer to the Model Selection section at left. However, after selecting the "from" model, do not touch the ENTER key.

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



After selecting the "from" or template model, proceed to select the destination or "to" model. To do so, simply touch the + or - keys on the bottom of the LCD screen. If you happen to select a model memory that is already occupied and you don't want to erase its programming, simply touch either the + or - keys. That is, if you accidentally select Model 1 as the destination model but do not want to copy over the existing data, select Model 2, 3, etc., by touching the + or - keys on the bottom of the LCD screen.

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

If you change your mind and do not wish to transfer the template ("from") model to any other model memory within your transmitter, you can simply copy it to itself without harming anything. Using our example, copy from Model 1 to Model 1. This would, in essence, negate the effects of the copy function.

Once the "to" and the "from" models have been properly selected, proceed with the copy function by pressing the ENTER key, returning you to the model selection.

To verify that the model has been transferred, access the "to" or destination model at this time. If you do not want to verify this process, touch the ENTER to exit the program.

Note: When copying model programs, say from Model 1 to Model 3, once the copy function has been completed, the name on the Model 3 will also be changed to that of the copied model (Model 1).

Set Up Tips

If you fly in contests, there is one thing that's unavoidable — wind! If you are a serious contest flier, or if you are one of those fliers who likes to fly in the wind, we suggest the following:

In calm winds, a low rotor speed is great for hovering maneuvers. However, if you use this set up in gusty wind conditions, your helicopter won't have enough control authority to overcome the wind blowing your machine around.

In gusty winds, a higher rotor speed (approximately 1,450–1,550 rpm) is desirable. It gives more collective authority to hold your heli in one place. Plus, a higher rpm results in more tail rotor power for cutting into the wind during pirouettes, etc.

Many top pilots are using the PCM10X's multiple storage capability to program two different set ups: 1) a calm wind hovering set up with the pitch curve raised and the throttle curve lowered for a lower rpm, and 2) a windy hovering set up with the pitch curve lowered and the throttle curve raised for a higher rpm set up. The forward flight mode (Idle Up 1 and 2) remains the same.

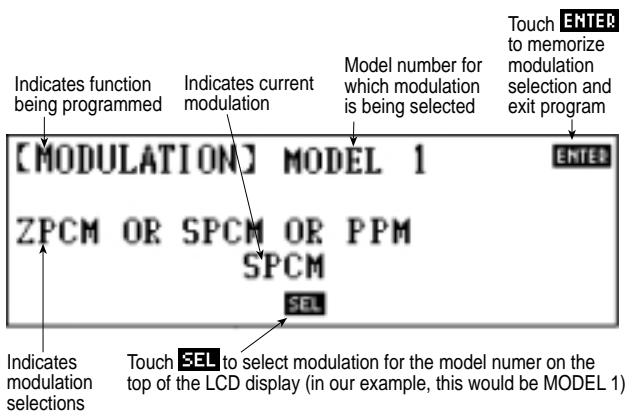
The important thing is to practice in both calm and blowing wind to optimize each set up.

Modulation Selection

This function enables your PCM10X to transmit to a variety of JR receivers that are already or may soon be in existence. You can select from either of two types of PCM, ZPCM or SPCM, depending on the Central Processing Unit within your receiver, or from linear PPM (pulse position modulation). Refer to the receiver compatibility chart for the correct modulation.

Accessing and Utilizing the Modulation Selection Function

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



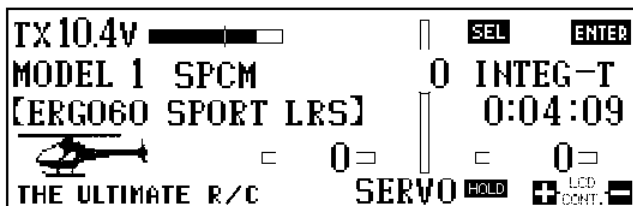
The type of modulation currently being used appears above the SEL key on the display screen. To change modulation types, touch the SEL key.

Note: Anytime Code 28, Data Reset, is used, the PCM-10X refers back to the factory default for all settings, modulation included. This means that the modulation type returns to the SPCM.

Note: The modulation selection process takes place immediately. There is no longer a need for the power switch to be shut "off."

To exit the modulation selection, touch the ENTER key after selecting the proper modulation.

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



Receiver Compatibility Chart

Transmitter Modulation	Compatible Receivers	# of Channels & Brief Description
PPM	NER-226	6 (micro)
PPM	*NER-228	8
PPM	*NER-327x	7
PPM	*NER-527x	7 (micro)
PPM	*NER-529x	9 (micro)
PPM	NER-549x	9
PPM	NER-600	6 (micro)
ZPCM	NER-236	6 (micro)
ZPCM	*NER-627XZ or 627 "G" series	7
ZPCM	*NER-J329P	9
SPCM	NER649S	9
ZPCM	NER-910XZ	10
SPCM	NER-D940S	10
SPCM	NER-950S	10

Note: Receivers marked with an * are no longer in production.

Note: The PCM-10X cannot be used with the NER-627X, NER-629X or the NER-J229P receivers. The Control Processing Units (CPUs) are not compatible.

Data Transfer

The Data Transfer function is used to transmit and receive model memory between two PCM10X helicopter transmitters. This data is transferred, and therefore received, one model at a time. You can determine which model number is transferred, as well as the model number it will be assigned on the receiving transmitter. The program is so designed to prevent the receiving radio from accidentally erasing current models.

Note: The Data Transfer function is only applicable between two PCM10X helicopter radios or to/from the JR DataSafe. The Data Transfer functions properly regardless of differences in stick configuration (mode), frequency, etc., between the two transmitters. If data transfer is attempted between a PCM10X airplane radio and a PCM10X helicopter radio, or a PCM10X and a PCM10SxII radio, a warning message appears on the receiving side of the transfer.

Note: In order to perform the Data Transfer function, you need to obtain a JR trainer cord from your local hobby dealer.

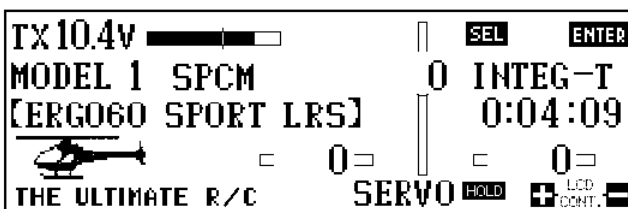
Accessing and Utilizing the Data Transfer Function

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

Preparing the Transmit Radio

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

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



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

Note: The significance of this screen is that it indicates the current model number and name (if applicable). The PCM10X only transmits the current model number and name as displayed. Therefore, if this is not the model you wish to transfer to the receiving radio, access Code 84, Model Select, to recall the desired model for data transfer. You can use the code number

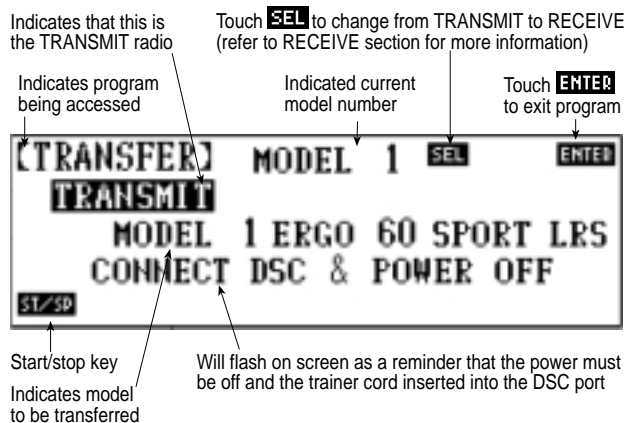
access selection or the direct mode method, as if the radio were in the ON position. Refer to Section 8.24 in this manual for further information on the Model Select function.

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

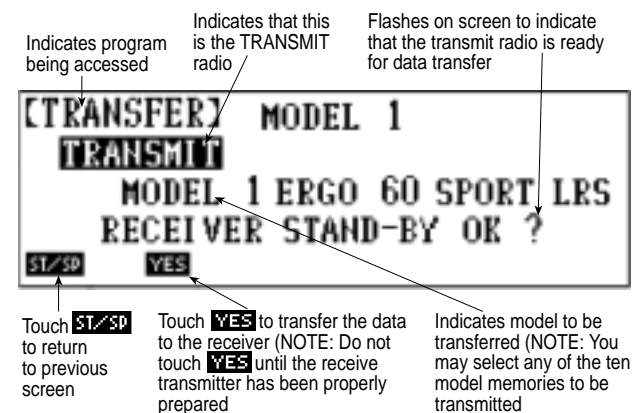
To Access the Data Transfer Function

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

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



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



Now begin preparation of the receiver transmitter.

Preparing the Receiving Transmitter

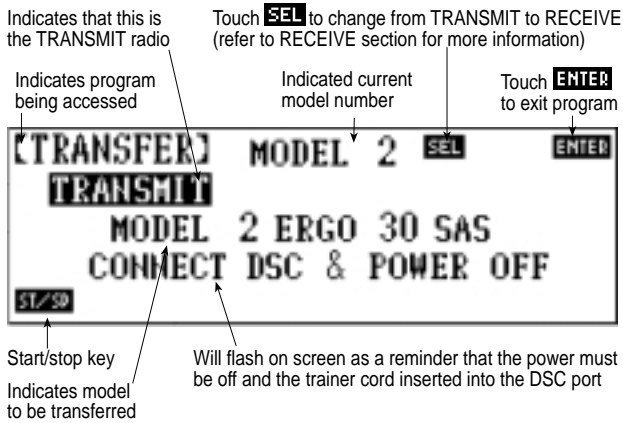
The power switch must be in the “off” position.

Insert the other end of the JR trainer cord into the direct servo control port located in the rear of the transmitter. The pilot lamps

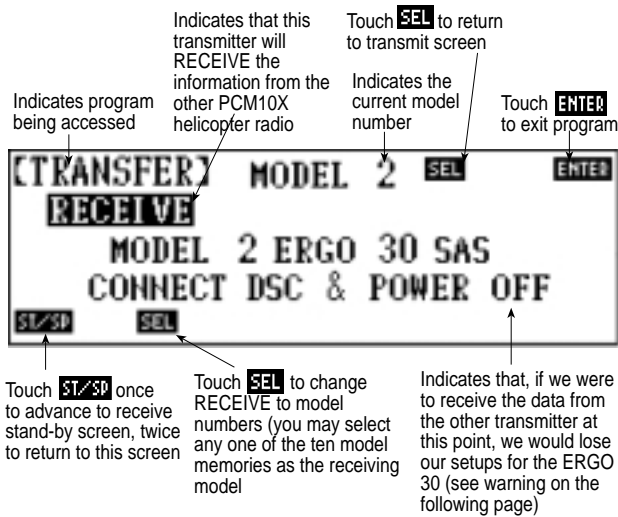
will not glow as they do when the power switch is ON. However, the LCD will be visible. The initial screen that appears is the same screen as appeared at the transmit side. Unlike the transmit side, however, you can select the receive model after you have accessed the Data Transfer function.

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

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



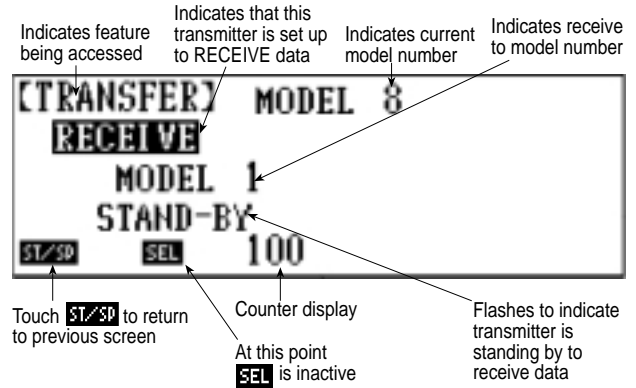
Touch the SEL key in the upper right hand side of the LCD screen. Your radio changes from the transmit to the receiver radio at this point. The LCD screen will change accordingly.



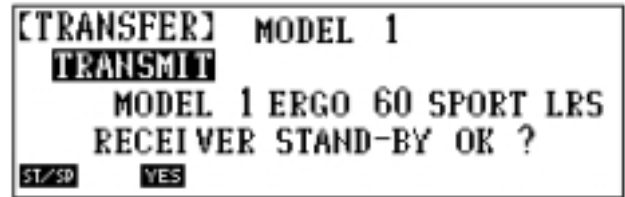
The receive to model is indicated directly above the blinking CONNECT DSC & POWER OFF display. If you want to transfer data to the indicated model, press the ST/SP key to advance to the receive standby screen. If the receive to model is in use (i.e., you have already input data to that specific model and do not want to erase it), you can select a different receive to model at this time. To do so, press the SEL key until a model memory that is not in use appears.

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

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



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

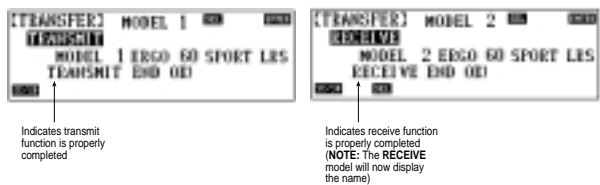


Next, press the YES key on the TRANSMIT radio. At this point, you will see both transmitters reactions simultaneously.



"Receiver Stand-by OK?" will disappear from the screen at the same time 100 will appear next to the YES key and will decrease rapidly until it reaches 0. Once it reaches 0 the screen will immediately change once again.

"Stand-by" will disappear from the screen and at the same time 100 will rapidly count down until it reaches 0. Once it reaches 0 the screen will immediately change once again.



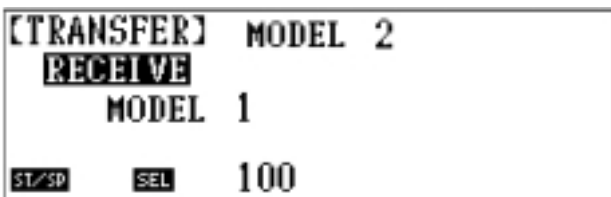
Note: If you have copied another pilot's program for his radio controlled helicopter for the purpose of flying your own helicopter, be sure to familiarize yourself with all the set-ups. The

receive model receives all data, modulation, servo travel direction, endpoints (ATV), etc., from the transmit model. Failure to check operation with your helicopter may result in a crash.

Data Transfer Warnings

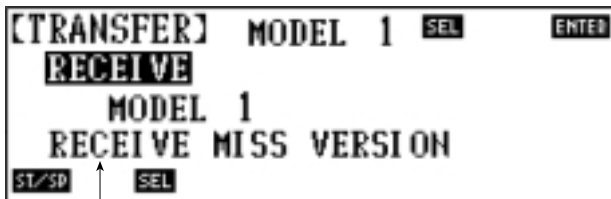
When the data transfer function is not working properly, the counter display stops functioning. At this time, press the ST/SP key and stop the transfer. Check to ensure that all DSC connections are properly fastened and that one radio is set up to transmit data. If you cannot locate the problem, remove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

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



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

The other warning will appear as follows:



Indicates the receiving transmitter has received wrong data

This indicates that the receiving model has received improper data, e.g., transfer of data from a PCM10X airplane to a PCM10X helicopter radio.

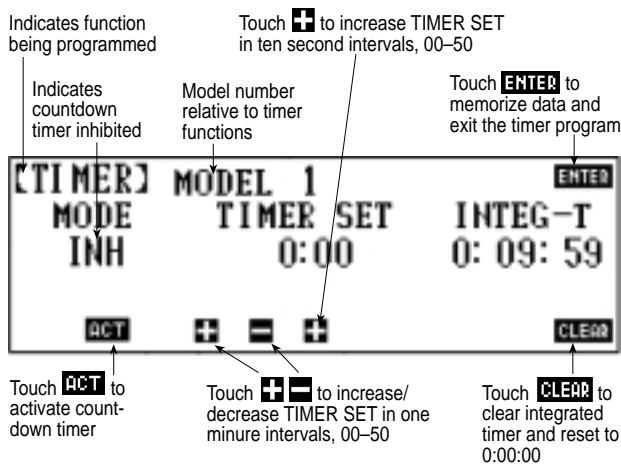
Timer

The PCM10X has both an integrated timer and a count-down timing feature. The integrated timer serves as an up-timer, displaying the accumulated time usage for each model in the transmitter's memory. The count-down feature is used as a stopwatch for timed flights.

Accessing the Integrated Timing Function

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

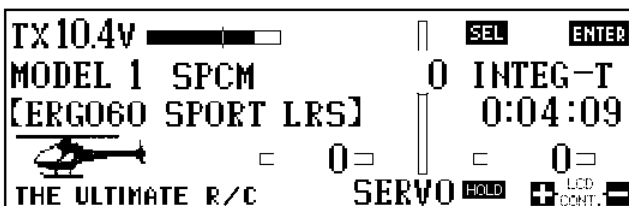
The screen will display:



Note: Here we will only discuss the integrated timer on the right portion of the LCD display. For more information on the count-down feature, please refer to the Count-Down Timer Section which follows.

Integrated Timer

The integrated timer displays each model's accumulated time of use. After 60 hours, the integrated timer automatically resets to 0:00:00. There are two screens where the integrated timer can be viewed: 1) in Code 87, timer function, as mentioned previously, and 2) in the initial screen of the PCM10X. This screen will appear as follows:



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

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

The Count-Down Timer

This is the left half of the screen.

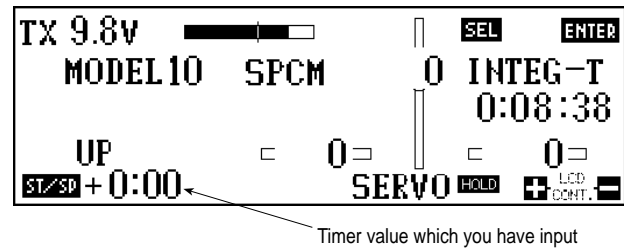
To activate the Count-Down Timer function, touch the ACT key. Your display changes to show that it has been activated.

To adjust the time for the count-down timer, press the + and/or - keys. From left to right on the timer display they: 1) add minutes to the timer in one (1) minute intervals up to 60 minutes, 2) subtract minutes from the timer in one (1) minute intervals to 00 minutes, 3) add seconds to the timer in ten (10) second increments up to 50 seconds.

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

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

The screen should now show:



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

Use of the Count-Down Timer

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

Touch the CLEAR key to reset the count-down timer to the preselected time.

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

Keyboard Lock

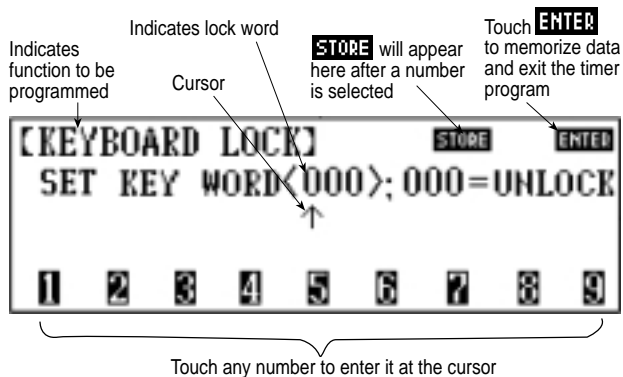
This feature enables you to enter a three digit code, or lock word, so that your model settings are safe-guarded against curiosity seekers who like to tamper with radios. This code can be reset and stored as often as you like.

Note: Please write down your lock word and keep it some-place safe. If you forget your word, the transmitter has to be sent to the Horizon Service Center to be unlocked.

Accessing and Utilizing the Keyboard Lock Function

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

The display will show as follows:



After you have accessed the Keyboard Lock function, an arrow appears on the display screen under the first of three numbers. This arrow serves as the cursor for your lock word selection. Determine your three number lock word and touch the corresponding numbers on the bottom of the LCD screen to enter them on the PCM10X display.

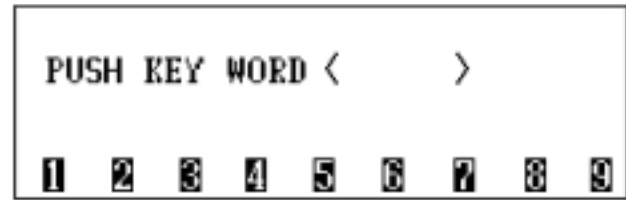
Note: The cursor automatically advances to the next position after a number is selected.

Touch the STORE key (appears after the first numerical selection) to store the selected lock word in the PCM10X's memory.

Touch ENTER to exit the program.

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

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



At this point, enter your lock word on the key pad at the bottom of the LCD display. As you enter numbers, an asterisk appears between the < > in the corresponding position. If you have entered the correct word, the display changes to the code number access selection screen. If you have not entered the proper key word, the PCM10X does not let you proceed any further.

Note: You are able to operate the transmitter without the lock word entry. However, for safety reasons, we suggest that you enter a lock word prior to flight.

9

Battery Charging

9.1

Transmitter/Receiver

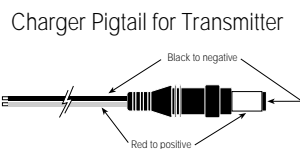
Note: It is imperative that you fully charge both the transmitter and the receiver battery packs prior to each flight. To do so, leave the charger and batteries hooked up overnight (16 hours). The first charge should be approximately 20–24 hours in order to fully charge both battery packs to peak capacity.

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

Transmitter Only

The center pin on all JR remote control systems 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 code" wire leads, as they **do not apply** in this instance. You must make certain that the center pin of your JR transmitter is always connected to the negative voltage for correct polarity hookup.

Note: Please refer to the following diagrams:



Charger Pigtail to Receiver



Red=positive Brown=negative Orange=signal

Please note this is different than Tx charge polarity.

9.2

Charger

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

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

Do not use other manufacturers' after-market accessories that plug into the transmitter's charge jack. If you do, any resultant damage will not be covered by warranty. If you are unsure of compatibilities with your radio, seek expert advice before doing anything to avoid possible damage.

During the charging operation, the charger's temperature is slightly elevated. This is normal. Also, note that the voltage shown on the charger is higher than the battery in use. This voltage can not be measured with a voltmeter. Only current can be measured with any accuracy using this type of charger.

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

10

Servo Precautions

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

Note: Coreless servos (all servos in the thousand series from JR, e.g., DS8231, 4721, 4131, etc., are coreless) make a slight buzzing noise even at the center position. This is normal and is caused by the motor constantly locking on its center position.

- Use the supplied rubber grommets and brass servo eyelets when mounting your servos. Do not overtighten the servo mounting screws as this negates the dampening effect of the rubber grommets.
- Ensure that the servo horn is securely fastened to the servo. Use only the JR servo arm screws provided — the thread size is different from that used by other manufacturers.
- Do not continue to use the servo arms when they become “yellowed” or discolored. Such servo arms may be brittle and snap at any time, possibly causing the helicopter to crash.
- Check all related mounting screws and linkages frequently. Helicopters often vibrate. These vibrations may loosen the linkages and/or screws.

11

General Notes

Radio controlled models are a great source of pleasure.

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

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

- Ensure that your batteries have been properly charged prior to initial flight.
- Keep track of the time that the system is turned on so that you will have an idea of how long you can safely operate your system.
- Perform a range check prior to the initial flight of the day. See Section 13, Daily Flight Checks, for information on how to do so.
- Check all control surfaces prior to each take off.
- Use frequency flags.
- Do not fly your model near spectators, parking areas, or at any other place that could result in injury to people or damage to property.
- Do not fly during adverse weather conditions. Poor visibility can cause disorientation and loss of control of your aircraft. Strong winds can cause similar problems.
- Do not fly unless your frequency is clear.

Warning: Only one transmitter at a time can operate on a given frequency. If you should turn on your transmitter while someone else is operating a model on your frequency, both pilots will lose control of their models. Only one person can use a given frequency at a time.

It does not matter if it is AM, FM or PCM — only one frequency at a time.

- Do not 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.

Remember: Safety can never be taken lightly.

12

Federal Aviation Administration

1. Purpose: This advisory outlines safety standards for operations of model aircraft. We encourage voluntary compliance with these standards.

2. Background: Attention has been drawn to the increase in model aircraft operation. There is a need for added caution when operating 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.

3. Operating Standards: Modelers generally are concerned with safety and exercise good judgment when flying model aircraft. However, in the interest of safer skies, we encourage operators of radio controlled 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.

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

13

Daily Flight Checks

1. Check the battery voltage on both the transmitter and the receiver battery packs. Do not fly below 9.0 volts on the transmitter or below 4.7 volts on the receiver. To do so invites a crash of your helicopter.

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, bolts) prior to each day's flight. Be sure that binding does not occur and that everything is properly secured.

3. Ensure that all surfaces are moving in the proper manner.

4. Perform a range check before each day's flying session. The range check should be as follows:

- Do not install the antenna on your PCM10X transmitter during the range test. Turn the transmitter "on."
- Turn the model "on."
- Slowly walk away from the model while moving the control surfaces. The helicopter should function properly at a distance of 60 paces.

5. Just prior to starting your helicopter, turn "off" your transmitter and then turn it back "on." Do this each time you start your helicopter. If any critical switches are on without your knowledge, the transmitter alarm will warn you at this time.

6. Ensure that all trim levers are in the proper location.

7. Check to be sure that all servo pigtails and switch harness plugs are secured in the receiver. Also, make certain that the switch harness moves completely in both directions.

14 Frequency Chart

72 MHz requires no special license to operate.

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

Low Band 72 MHz		High Band 72 MHz		50MHz	
Ch. No.	Frequency	Ch.No.	Frequency	Ch.No.	Frequency
15	72.090	36	72.510	00	50.8000
16	72.110	37	72.530	01	50.820
17	72.130	38	72.550	02	50.840
18	72.150	39	72.570	03	50.860
19	72.170	40	72.590	04	50.880
20	72.190	41	72.610	05	50.900
21	72.210	42	72.630	06	50.920
22	72.230	43	72.650	07	50.940
23	72.250	44	72.670	08	50.960
24	72.270	45	72.690	09	50.980
25	72.290	46	72.710		
26	72.310	47	72.730		
27	72.330	48	72.750		
28	72.350	49	72.770		
29	72.370	50	72.790		
30	72.390	51	72.810		
31	72.410	52	72.830		
32	72.430	53	72.850		
33	72.450	54	72.870		
34	72.470	55	72.890		
35	72.490	56	72.910		
		57	72.930		
		58	72.950		
		59	72.970		
		60	72.990		
Low Frequency 53 MHz			High Frequency 53 MHz		
Ch. No.	Frequency	Flag Color	Ch. No.	Frequency	Flag Color
A1	53.100	Black/Brown	A6	53.600	Black/Blue
A2	53.200	Black/Red	A7	53.700	Black/Purple
A3	53.300	Black/Orange	A8	53.800	Black/Gray
A4	53.400	Black/Yellow			
A5	53.500	Black/Green			

Note: JR Radios are not available on channels 11–14.

15 Use of a Gyro

A gyro stabilizer, commonly referred to as a gyro or gyro sensor, is used to sense the movement around a given axis and to apply an opposite action to the appropriate servo. Most frequently, the gyro is installed on the yaw or left and right axis to dampen the twitchiness of the rudder (tail rotor).

You can use any manufacturer's gyro with your JR radio system, provided that the gyro is specified for use with a JR radio.

Although most helicopters are capable of flight without a gyro, the gyro (if properly adjusted) prevents many frustrations and crashes. This is especially true with novice helicopter pilots.

Note: A gyro cannot act. It can only react to a given situation. In other words, it does not act as an autopilot to prevent situations that might occur. It can only correct for a current situation.

Installing the Gyro

Prior to installing the gyro, it is important that you familiarize yourself with the manufacturer's instructions.

When installing the gyro, never mount it directly to the frame of your helicopter. Vibrations passing directly into the motor unit or piezo sensor can drastically shorten the life of your gyro. Instead, mount the gyro using at least two layers of thick double-sided servo tape. This tape does not affect the gyro's ability to sense movement. It lessens the possibility of vibration damage to the motor.

If you have a gyro with dual rates, such as the JR120BB gyro, you can select a receiver channel for the second rate. Many pilots use the auxiliary 3 rudder dual rate channel, so that as the rudder dual rates are switched, the gyro sensitivity also switches. You may prefer to use the auxiliary 2 or the gear switch, depending on your flying style and personal choice. If you plan to install a JR Piezo Gyro (NEJ-450, NEJ-3000), Code 44 Gyro Sensitivity Adjustment function may be used in the AUX 3 channel. This feature allows the gyro gain to be changed automatically with the flight mode switch or independently with the AUX 3 switch.

After the gyro is installed in your helicopter, adjust the sensitivities, neutral point and tail rotor output direction for the gyro.

Note: The neutral point and tail rotor output directions should all be performed per manufacturer's direction and with the helicopter on the ground.

Flying with a gyro that is not functioning properly is worse than flying with no gyro at all.

16

Warranty Information

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

Warranty Coverage

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

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

Repair Service Directions

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

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

3. Preferably, use the original carton/packaging (molded foam container), or equivalent, to ship your system. Do not use the system carton itself as a shipping carton. You should package the system carton within a sturdy shipping container using additional packing material to safeguard against damage during transit. Include complete name and address information inside the carton, as well as clearly writing it on the outer label/return address area.

4. Include detailed information explaining your operation of the system and problem(s) encountered. Provide an itemized list of equipment enclosed and identify any particular area/function which may better assist our technicians in addressing your concerns. Date your correspondence, and be sure your complete name and address appear on this enclosure.

5. Include your name, mailing address, and a phone number where you can be reached during the business day.

6. **Warranty Repairs.** To receive warranty service, you must include your original, dated sales receipt to verify your proof-of-purchase date. Providing that warranty conditions have been met, your radio will be repaired without charge.

7. **Normal Non-Warranty Repairs.** Should your repair cost exceed 50% of the retail purchase cost, you will be provided with an estimate advising you of your options.

Within your letter, advise us of the payment method you prefer to use. Horizon Service Center accepts VISA or MasterCard. Include your card number and expiration date. Horizon Service Center also accepts money orders.

Mail your system to:

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

MODEL NO. (84) _____

MODEL NAME (81) _____

MODULATION (85) SPCM-ZPCM-PPM

	THRO	AILE	ELEV	RUDD	GEAR	PITCH	AUX2	AUX3	AUX4	AUX5
REVERSE SW (11)	R N	R N	R N	R N	R N	R N	R N	R N	R N	R N
TRAVEL ADJUST (12)	H %	L %	D %	L %	+ %	+ %	+ %	+ %	+ %	+ %
	L %	R %	U %	R %	- %	- %	- %	- %	- %	- %
SUB-TRIM (15)										
TRIM RATE (83)	%									

			AILE	ELEV	RUDD
D/R EXP (13)	0	D/R	%	%	%
		EXP	%	%	%
		TYPE			
	1	D/R	%	%	%
		EXP	%	%	%
		TYPE			
2	D/R	%	%	%	
	EXP	%	%	%	
	TYPE				
AUTO D/R (23)	ST-1	INH-ACT	0 · 1 · 2	0 · 1 · 2	0 · 1 · 2
	ST-2	INH-ACT	0 · 1 · 2	0 · 1 · 2	0 · 1 · 2
	ST-3	INH-ACT	0 · 1 · 2	0 · 1 · 2	0 · 1 · 2
	ST-4	INH-ACT	0 · 1 · 2	0 · 1 · 2	0 · 1 · 2
	HOLD	INH-ACT	0 · 1 · 2	0 · 1 · 2	0 · 1 · 2

THROTTLE HOLD (16)	HOLD SW	INH· HOLD GEAR
	POS	
	AUTO CUT	INH-ACT
	Delay	1/4 1/2 3/4 1

FUNCTION SELECT (17)	FLIGHT EXTRA	INH· GEAR AILE	
	GEAR SW	INH· GEAR HOLD	
	AUX2 SW	INH-ACT	
	PIT. LEVER	LOW	INH-ACT
		HI	INH-ACT
ADT STUNT	INH-ACT		

GYRO SENS (44)	INH· AUX 3 AUTO	0	
		1	
		2	
		NR	S1 S2 S3 S4 HD

			CHANNEL	TRIM	SW	OFFSET	+GAIN	-GAIN	
	MASTER	SLAVE							
PROGRAM MIX (51) - (58)	1	INH· ACT	→	OFF ON	NR-S1-S2-S3-S4 HD-AX2-GER				
	2	INH· ACT	→	OFF ON	NR-S1-S2-S3-S4 HD-AX2-GER				
	3	INH· ACT	→	OFF ON	NR-S1-S2-S3-S4 HD-AX2-GER				
	4	INH· ACT	→	OFF ON	NR-S1-S2-S3-S4 HD-AX2-GER				
						EXP	L	1 2 3 4 5 6 H	
	5	INH· ACT	→	OFF ON	NR-S1-S2-S3-S4 HD-AX2-GER	OFF ON	IN 0		100
	6	INH· ACT	→	OFF ON	NR-S1-S2-S3-S4 HD-AX2-GER	OFF ON	IN 0		100
	7	INH· ACT	→	OFF ON	NR-S1-S2-S3-S4 HD-AX2-GER	OFF ON	IN 0		100
8	INH· ACT	→	OFF ON	NR-S1-S2-S3-S4 HD-AX2-GER	OFF ON	IN 0		100	

		EXP		L	1	2	3	4	5	6	H	
THRO CURVE (18) TH,TRIM=SLOW HOV.T=CENTER	N	OFF ON	IN	0							100	
			OUT									
			HOV.SEL	---	HOV	HOV	HOV	HOV	HOV	HOV	HOV	---
	1	OFF ON	IN	0								100
			OUT									
	2	OFF ON	IN	0								100
			OUT									
	3	OFF ON	IN	0								100
			OUT									
	4	OFF ON	IN	0								100
			OUT									
	PITCH CURVE (68) P,TRIM=CENTER HOV.P=CENTER	N	OFF ON	IN	0							100
OUT												
HOV.SEL				---	HOV	HOV	HOV	HOV	HOV	HOV	HOV	---
1		OFF ON	IN	0								100
			OUT									
2		OFF ON	IN	0								100
			OUT									
3		OFF ON	IN	0								100
			OUT									
4		OFF ON	IN	0								100
			OUT									
HOLD		OFF ON	IN	0								100
	OUT											

TAIL ROTOR CURVE (47)	N	NOR	IN	L	1	2	3	4	5	6	H	
		ORG	OUT									
	1	NOR	IN	0								100
		ORG	OUT									
	2	NOR	IN	0								100
		ORG	OUT									
	3	NOR	IN	0								100
		ORG	OUT									
	4	NOR	IN	0								100
		ORG	OUT									
MIX RATE		1/1 · 1/2 · 1/4 · 1/10										

TRIM OFFSET (82)	HV.T	HV.P	LO.P	HI.P

Rudder→Throttle 4→1 MIX (41)	R	%
	L	%
MODE SELECTION	NR · S1 · S2 · S3 · S4 · AX2	

FAIL-SAFE (77)	Z	MODE	HOLD · 1.0s · 0.5s · 0.25s
		MEMORY	
	S	MEMORY	

Aileron→Throttle 2→1 MIX (41)	R	%
	L	%
MODE SELECTION	NR · S1 · S2 · S3 · S4 · AX2	

SWASHPLATE MIXING TYPE (65)	1 SERVO · 3SERVO - 120°CCPM · 3SERVO - 140°CCPM			
	1SERVO	ELE → AIL	D	%
			U	%
		AIL → ELE	L	%
R	%			
SWITCH	NR · S1 · S2 · S3 · S4 · HD			
3 SERVO 120° CCPM	AIL	%	ELE	%
3 SERVO 140° CCPM	AIL	%	ELE	%
			PIT	%

Elevator→Throttle 3→1 MIX (41)	U	
	D	
MODE SELECTION	NR · S1 · S2 · S3 · S4 · AX2	



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