mx-12.GB

Graupner | JR

REMOTE CONTROL

COMPUTER-SYSTEM

mx-12

ROTARY-SELECT

Programming manual

Contents

The sole purpose of this manual is to provide information. It is subject to modification at any time, and must not be considered as any form of obligation on the part of the GRAUPNER company. GRAUPNER accepts no responsibility or liability for errors or inaccuracies which may be found in the information section of this manual.

Environ mental Protection Notes

When this product comes to the end of its useful life, you must not dispose of it in the ordinary domestic waste. The correct method of disposal is to take it to your local collection point for recycling electrical and electronic equipment. The symbol shown here, which may be found on the product itself, in the operating instructions or on the packaging, indicates that this is the case. Individual markings indicate which materials can be recycled and re-used. You can make an important contribution to the protection of our common environment by re-using the product, recycling the basic materials or recycling redundant equipment in other ways.
Remove batteries from your device and dispose of them at your local collection point for batteries.

If you don't know the location of your nearest disposal centre, please enquire at your local council office.

Safety notes

Please read carefully!

We all want you to have many hours of pleasure in our mutual hobby of modelling, and safety is an important aspect of this. It is absolutely essential that you read right through these instructions and take careful note of all our safety recommendations. If you are a beginner to the world of radio-controlled model aircraft, boats and cars, we strongly advise that you seek out an experienced modeller in your field and ask him for help and advice. These instructions must be handed on to the new owner if you ever sell the transmitter.

Application

This radio control system may only be used for the purpose for which the manufacturer designed it, i.e. for operating radio-controlled models which do not carry humans. No other type of use is approved or permissible.

Safety notes

SAFETY IS NO ACCIDENT

and ...

RADIO-CONTROLLED MODELS ARE NOT PLAYTHINGS

Even small models can cause serious personal injury and damage to property if they are handled incompetently.

Technical problems in electrical and mechanical systems can cause motors to rev up or burst into life unexpectedly, with the result that parts may fly off at great speed, causing considerable injury.

Short-circuits of all kinds must be avoided at all times. Short-circuits can easily destroy parts of the radio control system, but even more dangerous is the acute risk of fire and explosion, depending on the circumstances and the energy content of the batteries.

The circumstances and the energy content of the batteries.

Aircraft and boat propellers, helicopter rotors, open gearboxes and all other rotating parts which are driven by a motor or engine represent a constant injury hazard. Do not touch these items with any object or part of your body. **Remember that a propeller spinning at high speed can easily slice off a finger!** Ensure that no other object can make contact with the driven components.

Protect all electronic equipment from dust, dirt, damp, and foreign bodies. Avoid subjecting the equipment to vibration and excessive heat or cold. Radio control equipment should only be used in „normal“ ambient temperatures, i.e. within the range -15°C to +55°C. Avoid subjecting the equipment to shock and pressure.

Check the units at regular intervals for damage to cases and leads. Do not re-use any item which is damaged or has become wet, even after you have dried it out thoroughly. Use only those components and accessories which we expressly recommend. Be sure to use only genuine matching GRAUPNER connectors of the same design with contacts of the same material. Use only genuine GRAUPNER plug-in crystals on the appropriate frequency band. When deploying cables note that they must not be under tension, and should never be bent tightly or kinked, otherwise they may fracture. Avoid sharp edges which could wear through the cable insulation.

Check that all connectors are pushed home firmly before using the system. When disconnecting components, pull on the connectors themselves - not on the wires.

It is not permissible to carry out any modifications to the RC system components. Avoid reverse polarity and short-circuits of all kinds, as the equipment is not protected against such errors.

Installing the receiving system and deploying the receiver aerial

In a model aircraft the receiver must be packed in soft foam and stowed behind a stout bulkhead, and in a model boat or car should be protected effectively from dust and spray.

The receiver must not make contact with the fuselage, hull or chassis at any point, otherwise motor vibration and landing shocks will be transmitted directly to it. When installing the receiving system in a model with a glowplug or petrol engine, be sure to install all the components in well protected positions so that no exhaust gas or oil residues can reach the units and get inside them. This applies above all to the ON / OFF switch, which is usually installed in the outer skin of the model. Secure the receiver in such a way that the aerial, servo leads and switch harness are not under any strain.

The receiver aerial is permanently attached to the receiver. It is about 100 cm long and must not be shortened or extended. The aerial should be routed as far away as possible from electric motors, servos, metal pushrods and high-current cables. However, it is best not to deploy the aerial in an exactly straight line, but to angle it: e.g. run it straight to the tailplane, then leave the final 10 - 15 cm trailing down, as this avoids reception „blind spots“ when the model is in the air. If this is not possible we recommend that you lay out part of the aerial wire in an S-shape inside the model, close to the receiver if possible.

Safety notes

Installing the servos
Always install servos using the vibration-damping grommets supplied. The rubber grommets provide some degree of protection from mechanical shocks and severe vibration.

Installing control linkages
The basic rule is that all linkages should be installed in such a way that the pushrods move accurately, smoothly and freely. It is particularly important that all servo output arms can move to their full extent without fouling or rubbing on anything, or being obstructed mechanically at any point in their travel.It is important that you should be able to stop your motor at any time. With a glow motor this is achieved by adjusting the throttle so that the barrel closes completely when you move the throttle stick and trim to their end-points.Ensure that no metal parts are able to rub against each other, e.g. when controls are operated, when parts rotate, or when motor vibration affects the model. Metal-to-metal contact causes electrical „noise“ which can interfere with the correct working of the receiver.

Always extend the transmitter aerial fully before operating your model.
Transmitter field strength is at a minimum in an imaginary line extending straight out from the transmitter aerial. It is therefore fundamentally misguided to „point“ the transmitter aerial at the model with the idea of obtaining good reception.
When several radio control systems are in use on adjacent channels, the pilots should always stand together in a loose group. Pilots who insist on standing away from the group endanger their own models as well as those of the other pilots.

Pre-flight checking
If there are several modellers at the site, check carefully with all of them that you are the only one on „your“ channel before you switch on your own transmitter.If two modellers switch on transmitters on the same channel, the result is interference to one or both models, and the usual result is at least one wrecked model.

Before you switch on the receiver, ensure that the throttle stick is at the stop / idle end-point.
Always switch on the transmitter first, and only then the receiver.
Always switch off the receiver first, and only then the transmitter.
If you do not keep to this sequence, i.e. if the receiver is at any time switched on when „its“ transmitter is switched off, then the receiver is wide open to signals from other transmitters and any interference, and may respond. The model could then carry out uncontrolled movements, which could easily result in personal injury or damage to property. The servos may run to their end-stops and damage the gearbox, linkage, control surface etc. Please take particular care if your model is fitted with a mechanical gyro: Before you switch your receiver off, disconnect the power supply to ensure that the motor cannot run up to high speed accidentally. The gyro can generate such a high voltage as it runs down that the receiver picks up apparently valid throttle commands, and the motor could respond by unexpectedly bursting into life.

Range checking
Before every session check that the system works properly in every respect, and has adequate range. This means checking that all the control surfaces respond correctly and in the appropriate direction to the transmitter commands at a suitable ground range.
Repeat this check with the motor running, while a friend holds the model securely for you.

Operating your model aircraft, helicopter, boat or car
Never fly directly over spectators or other pilots, and take care at all times not to endanger people or animals. Keep well clear of high-tension overhead cables. Never operate your model boat close to locks and full-size vessels. Model cars should never be run on public streets or motorways, footpaths, public squares etc.

Checking the transmitter and receiver batteries
It is essential to stop using the radio control system and recharge the batteries well before they are completely discharged. In the case of the transmitter this means - at the very latest - when the message „Battery must be charged“ appears on the screen, and you hear an audible warning signal. It is vital to check the state of the receiver battery at regular intervals. When the battery is almost flat you may notice the servos running more slowly, but it is by no means safe to keep flying or running your model until this happens. Always replace or recharge the batteries in good time. Keep to the battery manufacturer’s instructions and don’t leave the batteries on charge for longer than stated. Do not leave batteries on charge unsupervised. Never attempt to recharge dry cells, as they may explode.
Rechargeable batteries should always be recharged before every session. When charging batteries it is important to avoid short-circuits. Do this by first connecting the charge lead banana plugs to the charger, taking care to maintain correct polarity. Only then connect the charge lead to the transmitter or receiver battery.

Safety notes

Disconnect all batteries and remove them from your model if you know you will not be using it in the near future.

Capacity and operating times
This rule applies to all forms of electrical power source: battery capacity is reduced every time you charge it.
At low temperatures capacity is greatly reduced, i.e. operating times are shorter in cold conditions.
Frequent charging, and / or the use of maintenance programs, tends to cause a gradual reduction in battery capacity. We recommend that you check the capacity of all your rechargeable batteries at least every six months, and replace them if their performance has fallen off significantly.
Use only genuine GRAUPNER rechargeable batteries!

Suppressing electric motors
All conventional electric motors produce sparks between commutator and brushes to a greater or lesser extent depending on the motor type; the sparking generates serious interference to the radio control system. In electric-powered models every motor must therefore be effectively suppressed.
Suppressor filters effectively eliminate such interference, and should always be fitted. Please read the notes and recommendations supplied by the motor manufacturer. Refer to the main GRAUPNER FS catalogue for more information on suppressor filters.

Servo suppressor filter for extension leads
Order No. 1040
Servo suppressor filters are required if you are obliged to use long servo extension leads, as they eliminate the danger of de-tuning the receiver. The filter is connected directly to the receiver input.
In very difficult cases a second filter can be used, positioned close to the servo.

Using electronic speed controllers
Electronic speed controllers must be chosen to suit the size of electric motor which they will control. There is always a danger of overloading and possibly damaging the speed controller, but you can avoid this by ensuring that the controller's current-handling capacity is at least half the motor's maximum stall current.
Particular care is called for if you are using a „hot" (i.e. upgrade) motor, as any low-turn motor (small number of turns on the winding) can draw many times its nominal current when stalled, and the high current will wreck the speed controller.

Electrical ignition systems
Ignition systems for internal combustion engines can also produce interference which has an adverse effect on the working of the radio control system.
Electrical ignition systems should always be powered by a separate battery - not the receiver battery.
Be sure to use effectively suppressed spark plugs and plug caps, and shielded ignition leads.
Keep the receiving system an adequate distance away from the ignition system.

Caution:
Radio control systems may only be operated on the frequency bands and spot frequencies approved in each EU country. You will find information on frequencies in the section entitled „Approved operating frequencies".
It is prohibited to operate radio control systems on any other frequency, and such misuse will be punished by the relevant authorities.

Static charges
Lightning causes magnetic shock waves which can interfere with the operation of a radio control transmitter even if the thunderstorm actually occurs several kilometres away. For this reason cease flying operations immediately when you notice an electrical storm approaching.

Static charges through the transmitter aerial can be life-threatening!

Care and maintenance
Don't use cleaning agents, petrol, water or other solvents to clean this equipment. If the case, the aerial etc. gets dirty, simply wipe the surfaces clean with a soft dry cloth.

Liability exclusion / Compensation
As manufacturers, we at GRAUPNER are not in a position to influence the way you install, operate and maintain the radio control system components. For this reason we are obliged to refute all liability for loss, damage or costs which are incurred due to the incompetent or incorrect use and operation of our products, or which are connected with such operation in any way.

Unless otherwise prescribed by law, the obligation of the GRAUPNER company to pay compensation is limited to the invoice value of that quantity of GRAUPNER products which was immediately and directly involved in the event in which the damage occurred. This does not apply if GRAUPNER is found to be subject to unlimited liability according to binding legal regulation on account of deliberate or gross negligence.

Computer system mx-12

6 channel digital proportional radio control system

Computer radio control system with 10 model memories, incorporating high-level technology. Modern computer system for excellent reliability and security. Simplified rotary programming technology for straightforward programming.

High-contrast graphic screen provides an accurate display of the transmitter battery voltage, modulation, model type, model name, model memory number, set-up data, throttle and collective pitch curves and model operating time.

- All-purpose radio control system, fully expanded as standard
- High-quality radio control system for F3A, F3B, F3C, F3D, F3E model aircraft, deltas and V-tail models. Fully expanded, offering 6 channels: 4 proportional channels with trims, 2 switched channels
- Convenient mode selector for simple switching between stick MODES 1 - 4 (throttle right / left). All mixer, set-up and reverse memory data are automatically converted if you switch modes
- Convenient wing mixer programs: DIFFERENTIAL FLAPERON (aileron differential mixer), ELEVON (deltas: aileron-elevator mixer), V-TAIL (V-tail models: elevator - rudder mixer)
- Convenient swashplate programs: SWASHPLATE TYPE (swashplate: 1 servo, 2 servos 180°, 3 servos 120°, 3 servos 90°)
- 10 model memories, with transfer of all essential programming and set-up parameters
- Compatibility with FM and FMsss (PPM) receivers as well as SPCM receiving systems
- High-contrast Multi-Data-Display LCD screen provides accurate monitoring even in bright sunlight; screen displays information such as mixer input data, set-up values, directions of rotation, trim values, programming information in multi-function programs, and transmitter battery operating voltage
- Wide range of mixer system, plus precisely variable end point and centre positions, making the system suitable for the demanding operator of model aircraft, boats and cars.
- REVERSE function, programmable for six servos
- MONIT: servo travel monitor for six servos
- MODEL NAME and model number programmable separately

- MODULATION: switchable PPM / SPCM
- DUAL RATE / EXPO switchable to two positions and programmable for three servo functions, available range 5 to 125%.
- DIFFERENTIAL FLAPERON (differential aileron mixer)
- SUB-trim memory system for offsetting all servo centres; also for adjusting older servo types and servos with no standard centre
- TRAVEL ADJUST: separate travel adjustment for both end-points of all servos adjustment range 0 to 150%. New type of adjustment enables programming of symmetrical and asymmetrical servi travels, e.g. to compensate for one warped wing or special applications.
- DSC socket for connection to flight simulator
- Integral visual and audible alarm system for transmitter battery and Lithium back-up battery

Set contents

mx-12 micro-computer transmitter with integral NiMH 8 NH-1700 TX battery, R 700 receiver on the appropriate frequency, pair of crystals on the same frequency, C 577 servo, switch harness, battery holder for receiving system

Six-channel micro-computer radio control system, fully expanded. Switchable PPM / SPCM modulation (4 proportional functions with trims, 2 switched functions)

Order No. **4722**	35 MHz band
Order No. **4722.B**	35 MHz-B-Band
Order No. **4723**	40 MHz band
Order No. **4723.41***	41 MHz band

*For export only

Specification mx-12 transmitter

Transmission system	FM / FMsss (PPM) and SPCM
FMsss crystals	35 MHz band; Order No. 3864.61 - .80 40 MHz band; Order No. 4064.50 - .92 41 MHz band; Order No. 4164.400 - .420
Channel spacing	10 kHz
Control functions max.	6
Channel pulse width	1,5ms +/- 0,5 mx, incl. trim
Aerial	9,6 ... 12 V
Current drain approx.	175 mA
Dimensions approx.	190 x 195 x 85 mm
Weight approx.	870 g incl. transmitter battery

Specification R 700 micro receiver

Aerial	4,8 ... 6 V
Current drain approx.	13 mA
Channel spacing	10 kHz
Sensitivity approx.	10 μV
Servo functions	7
Temperature range	-15° ... + 55° C
Aerial length approx.	950mm
Dimensions approx.	47 x 25 x16 mm
Weight approx.	16 g

Accessoires

Order No.	Description
1121	Neckstrap, 20mm wide
70	Neckstrap, 30mm wide
4179.1	Trainer lead for mx-12 *For use with Graupner hand-held transmitters with DSC sockets*
3290.8	Trainer lead for mx-12 *For use with Graupner mc-... transmitters with trainer sockets*

Spare Parts

Order No.	Description
3100.6	Antenna for mx-12

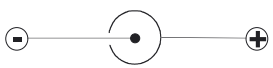
Charging the transmitter battery

Charging the transmitter battery

The rechargeable transmitter battery can be charged via the charge socket fitted to the side of the case. The transmitter must be switched **„OFF“** for the whole period of the charge process. Never switch on the transmitter when it is still connected to the charger; even a very brief interruption in the charge process can cause the charge voltage to rise to the point where the transmitter is immediately damaged by the excess voltage. Alternatively the interruption may trigger a new charge cycle, which means that the battery will possibly be severely overcharged.

For this reason check carefully that all connectors are secure, and making really good contact. Interruptions due to an intermittent contact, no matter how brief, inevitably cause the charger to malfunction.

Polarity of the mx-12 charge socket



Commercially available battery charge leads produced by other manufacturers are often made up with the opposite polarity. For this reason use genuine GRAUPNER charge leads exclusively.

Charge current

To avoid damage to the transmitter the maximum charge current should not exceed 500 mA (0.5 A) with the charge circuit fuse out of circuit (not fitted); with the charge circuit fuse in place: max. 1.5 A.

Notes on recharging transmitter batteries using an automatic charger

- Observe the recommendations provided by the charger manufacturer and the battery manufacturer at all times.
- Carry out a series of test charges to ensure that the automatic charge termination circuit works correctly with your battery. This applies in particular if you are using an automatic charger designed for NiCd batteries to recharge the standard NiMH battery. You may need to adjust the Delta-Peak trigger voltage, if your charger provides this option.
- The charge current must be set using the charger's „manual charge current select“ facility, to ensure that the maximum charge current never exceeds 1.5 A. Never allow the charger to set the charge current automatically.
- Do not discharge the battery or carry out a battery maintenance program via the integral charge socket. The charge socket is not suitable for this application.
- If you intend to charge the transmitter battery at a current higher than 1.5 A, the battery must be removed beforehand, otherwise the transmitter could be damaged through overheating.

Standard chargers

Order-No. **6422**	Minilader 2
Order-No. **6427**	Multilader 3
Order-No. **6426**	Multilader 6E*
Order-No. **6428**	Turbomat 6 Plus*
Order-No. **6429**	Turbomat 7 Plus*

Automatic chargers with special NiMH charge programs

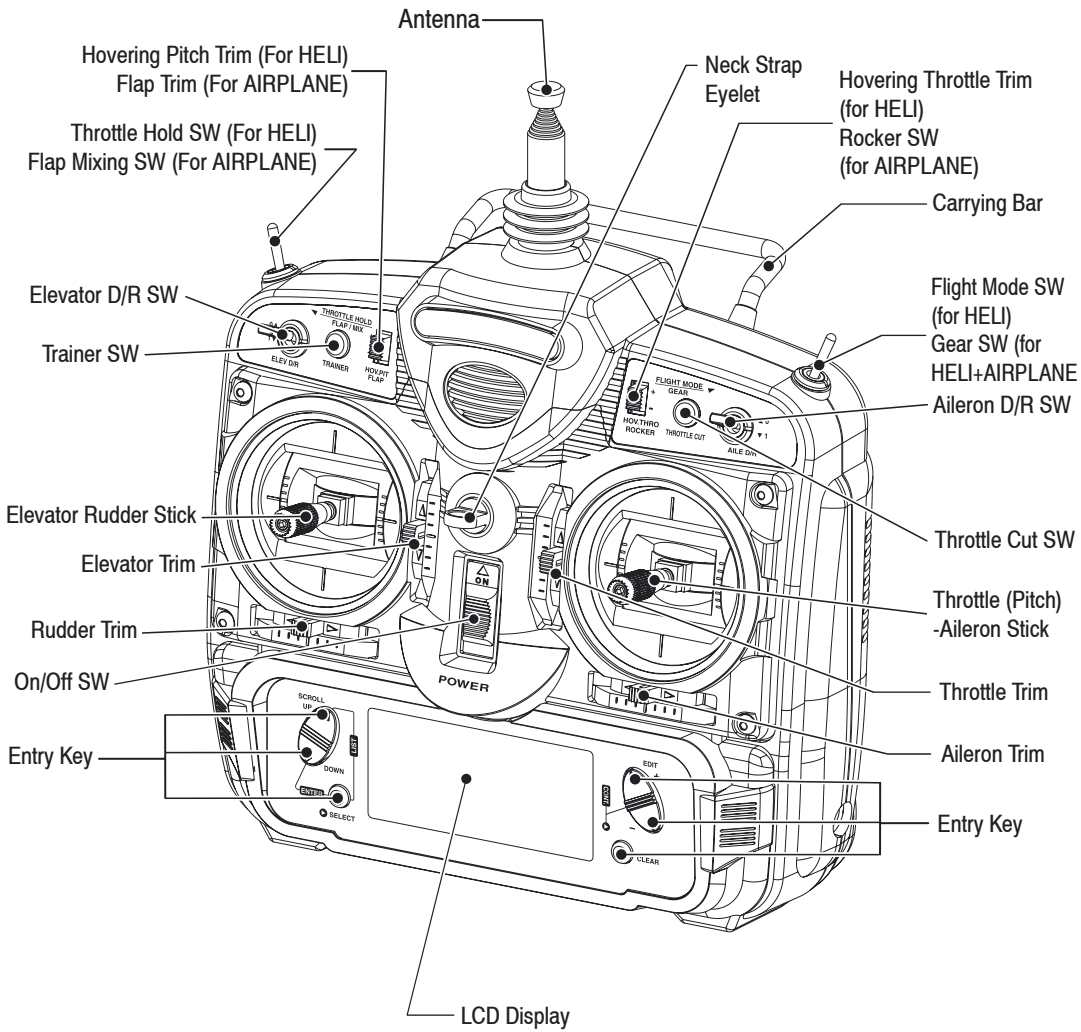
Order-No. **6419**	Ultramat 5*, **
Order-No. **6410**	Ultramat 10*
Order-No. **6412**	Ultramat 12*, **
Order-No. **6417**	Ultramat 25*, **
Order-No. **6416**	Ultra Duo Plus 30*, **

* To recharge the mx-12 system you will also need the transmitter charge lead, Order No. 3022, and the receiver battery charge lead, Order No. 3021.

** 12 V power source required.

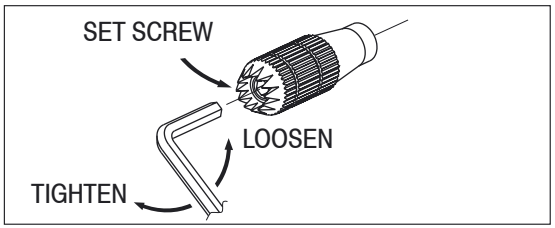
Transmitter description

Transmitter callouts



Control stick length adjustment

To adjust the stick lenght, use the 2mm Allen wrench (supplied with your mx-12 transmitter) to unlock the set screw. Turn the wrench counterclockwise to loosen the screw. Then turn the stick clockwise to shorten or counterclockwise to lenghten. After the control stick lenght has been adjusted to suit your flying style, tighten the 2mm set screw. If you desire longer sticks, GRAUPNER offers a stick that is approximately one inch longer than standard. This stick, crafted from bar stock aluminum, is available at your local GRAUPNER dealer.

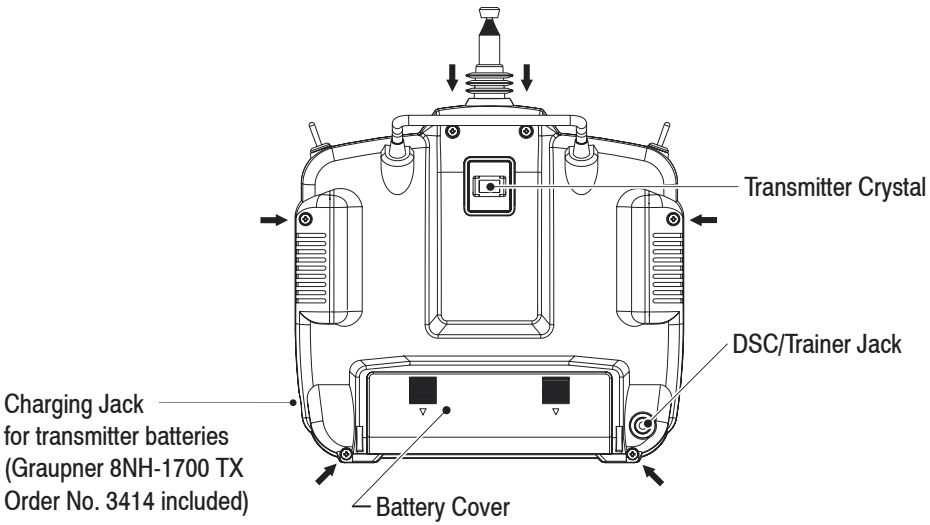


Neck strap attachment

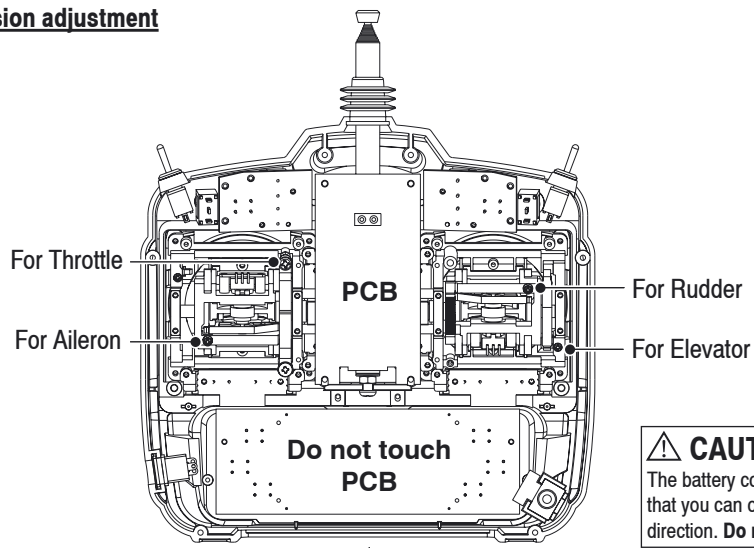
An eyelet is provided on the face of the mx-12 transmitter that allows you to connect a Neck Strap. This hook has been positioned so that your transmitter has the best possible balance when you use the neck strap.

Transmitter description

Transmitter Rear



Control Stick tension adjustment



⚠ CAUTION
The battery connector is keyed so that you can only be plugged in one direction. **Do not force!**

Control Stick tension adjustment
Remove the battery and six transmitter back screws as shown on the previous page. Remove the transmitter back, being careful not to cause damage to any components. Adjust each screw for desired tension (counter-clockwise to loosen stick feel; clockwise to tighten stick feel.) When adjusting the throttle ratched tension, make sure that the adjusting screw does not touch the PC board after adjustment is complete.

Throttle Stick
The initial setting for the throttle stick is ratched type.
If you don`t like this feeling, please follow the following instruction to change it. You will be required a posidrive screwdriver and a pair of tweezers;

1. Remove the model from back of the transmitter, by squeezing the lugs and pulling it out.
2. Remove the battery cover by pushing it inwards and downwards. Remove the battery.
3. Remove 4 screws from the rear 4 corners. Remove 2 screws, 1 from either side of the rear antenna base.
4. Carefully separate the 2 halves of the transmitter, starting at the base.
5. Unplug the 2 multi pin connectors for ease of access.
6. The left side of left stick unit has a black plastic lever and spring, which provide the centring action - move the stick if you are in doubt. Using the tweezers, remove the spring.
7. Slide the lever towards the center of the transmitter in order to remove ir from its pivot (move the stick to clear it if necessary).
8. Reverse the above process to fit the lever and spring to the right-hand assembly (note; the pivot is at the top of the right-hand stick assembly).

Direct servo control (DSC)

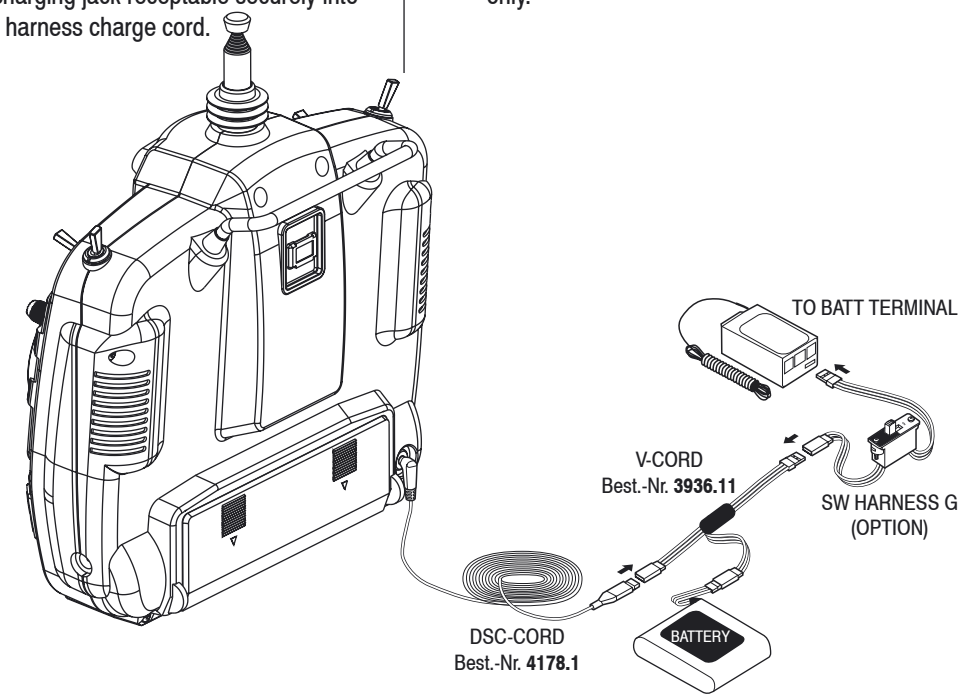
9. The left side of the right-hand assembly has a metal strip which provides the ratched friction action. This is held in place by two screws. Undo the screws and transfer the metal strip to the left-hand assembly.
10. The mechanical conversion is now completed; check the stick actions are as required and reassemble the transmitter by reversing the above process, not forgetting to plug in the multipin connectors.

Frequency notes
The mx-12 can transmit in either Pulse Code Modulation (PCM) or Pulse Position Modulation (PPM, commonly referred to as FM):

Be certain to observe the following guidelines:
Do not operate your transmitter when another transmitter is using the dame frequency, regardless of whether the second transmitter is PCM, PPM (FM) or AM. You can never operate two transmitters on the same frequency simultaneously without causinf interference.

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 (supplied) DSC cord 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 you install the charging jack, be sure to hook the charging jack receptable securely into the switch harness charge cord.

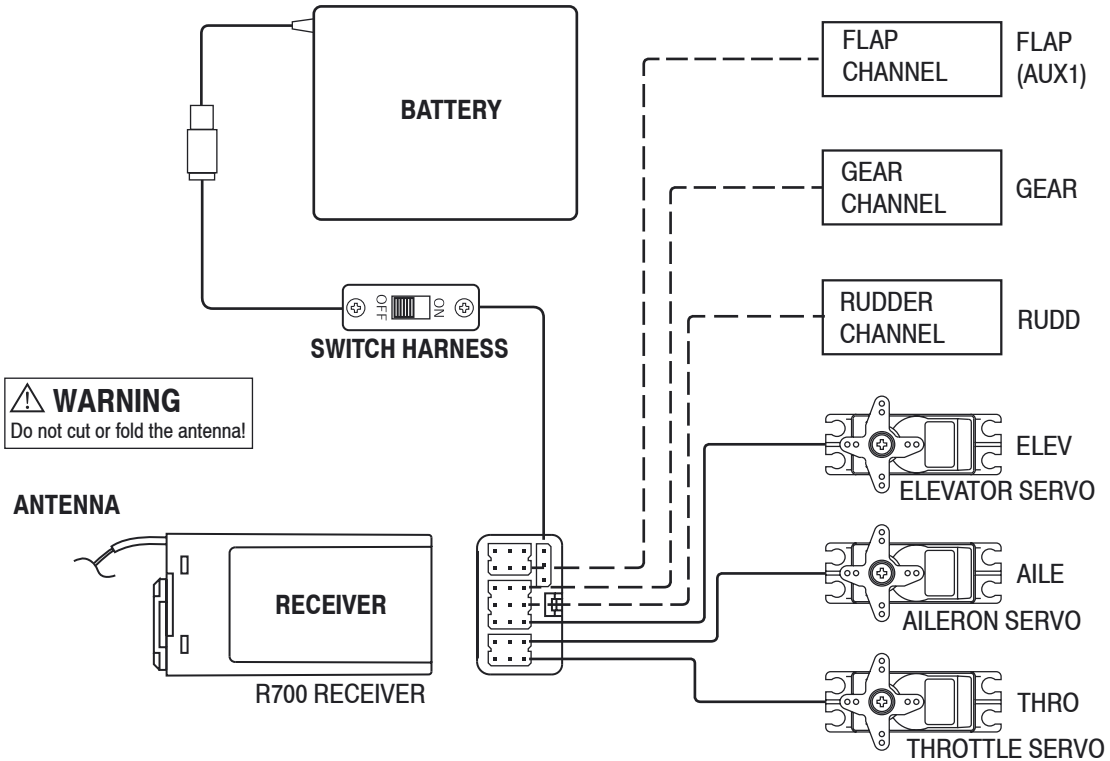


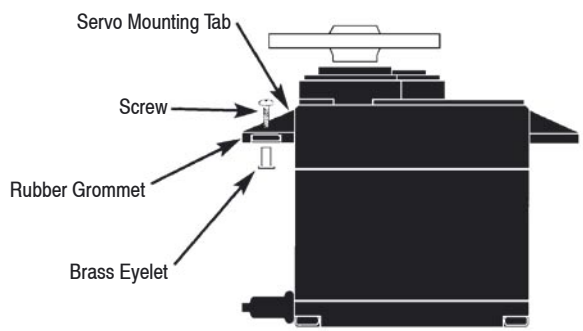
Why you should use the DSC function:
1. The DSC enables you to check the control surfaces of your aircraft without drawing the fully operational 200mAh from your transmitter battery pack. Instead, you will only draw approximately 70mAh when using the DSC function.
2. The DSC function allows you to make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

Note: This function is for bench-checking your airplane only.

Connections and installations

For Airplane





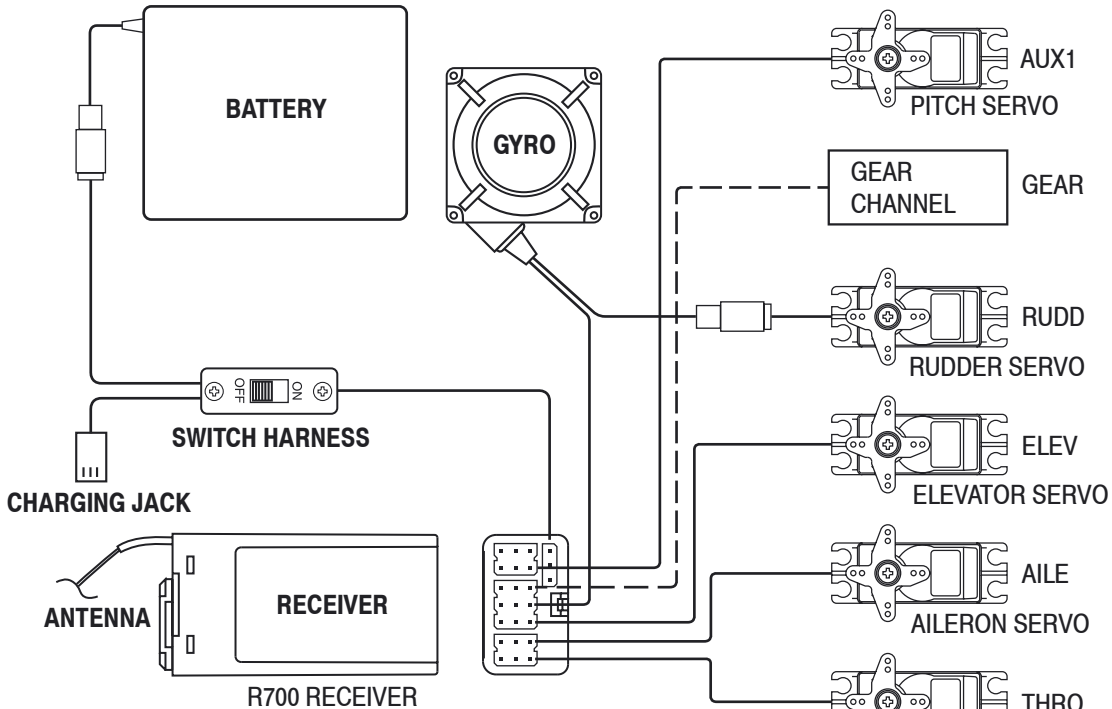
Installation requirements

It is extremely important that your radio system be correctly installed in your model. Here a few suggestions installing your GRAUPNER 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 protects the receiver in the event of a crash or a very hard landing.
2. The servos should be mounted using rubber grommets and brass eyelets to isolate them from vibration. Do not over-tighten the mounting screws; this will negate the vibration absorption effect of the rubber grommets. The following diagram will assist you in properly mounting your servo. The brass eyelet are pushed from the bottom up in the rubber grommets. When the servo screw is tightened securely, it provides the proper security as well as the proper vibration isolation for your servo.
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 airplane to ensure that it will not become entangled on the propeller or control surfaces.

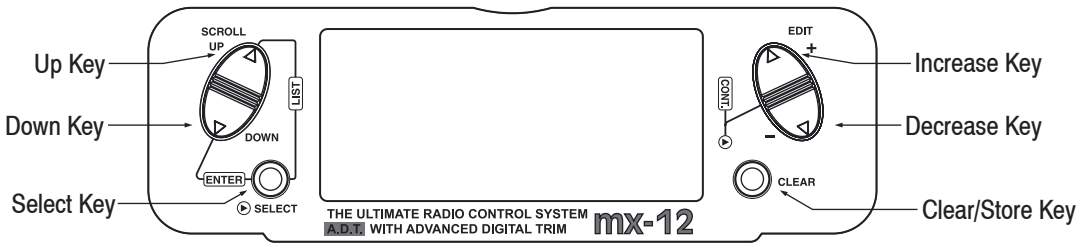
Connections and installations

For Helicopter



⚠ WARNING
Do not cut or fold the antenna!

Key input and display; Alarm and error display



The *Function* keys are used to move up and down through the functions. The *Select* key is used to advance the channel or function selected. The *increase* and *Decrease* keys are used to make changes in the selected functions.

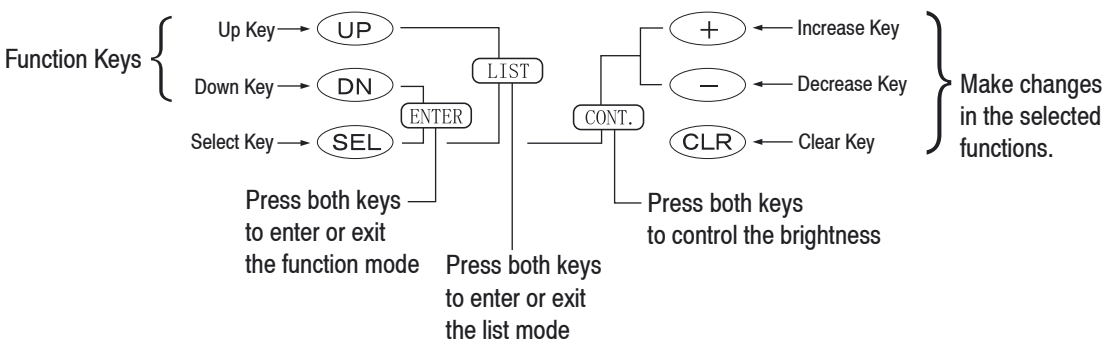
Battery alarm and display

When the transmitter voltage drops below 9.0 volts DC, the display flashes “BATT LOW“ and an alarm sounds. If you are flying when this occurs, land immediately.

Backup error display

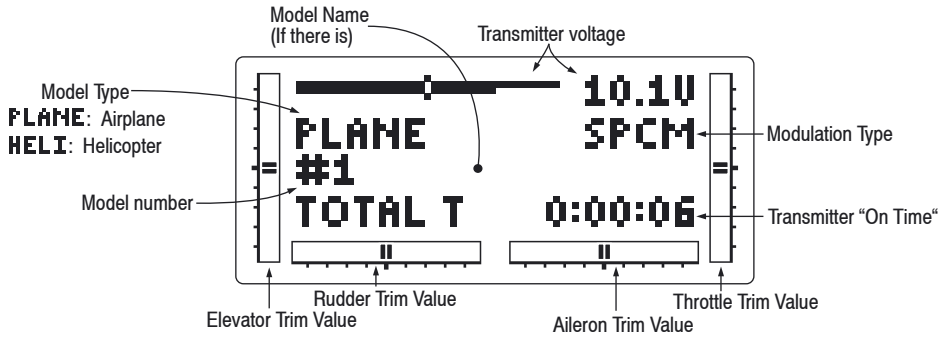
All preprogrammed data is protected by a five-year lithium battery that guards against main transmitter battery failure. Should de lithium battery fail, the display will indicate BACK ERROR. If this occurs it will be necessary to replace the lithium back-up battery, contact your local dealer. Due to the possibility of extensive damage caused by improper removal or replacement, only your local dealeris authorized to make this change.

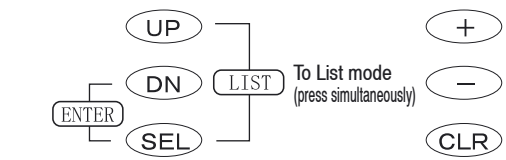
The Key displays in this case



Input mode and function

Normal mode



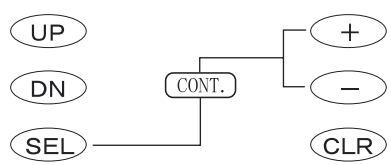


(To enter and exit the System mode, press simultaneously then turn on the power switch)

Screen contrast adjustment

The screen conrast adjustment feature of the mx-12 allows the user to select the proper tint of the screen for improved clarity and visibility in all weather conditions and temperatures.

To increase the contrast (darken the screen), simply turn the power switch ON and press the SEL and DATA + keys simultaneously. To decrease the contrast (lighten the screen), press the SEL and DATA - keys simultaneously.



Screen brightness control
(press simultaneously)

Advanced Digital Trim (A.D.T.)

The mx-12 digital trims feature the Direct Access display function. While at the Normal display screen, if a trim lever is moved, the screen will automatically change to display the graphic position for the trim being adjusted. The mx-12 Aileron, Elevator, Throttle and Rudder trim levers feature an audible center trim beep. This is helpful in determining the trim levers center position during flight. Please also note that unlike conventional mechanical trim levers, when the mx-12 transmitter is in the off position, no changes can be made to the trim values during transportation.

Model operating time

The standard display shows the total model operating time for the selected memory.

Selecting a new model, or erasing the memory and saving new data in it, resets the model operating time to the value "0:00:00".

Function mode

To enter the Function mode, switch the transmitter power switch to the On position. Press the *Down* and *Select* keys simultaneously, and the display will show the last active program. Pressing either the Up or Down key then scrolls through the functions one by one, according to the Function Mode Flowchart shown below. Once the appropriate function is displayed, changes can be made by pressing the (+) or (-) keys. To select another channel of a particular function, press the *Select* key. The Function mode is the most often used system to input data.

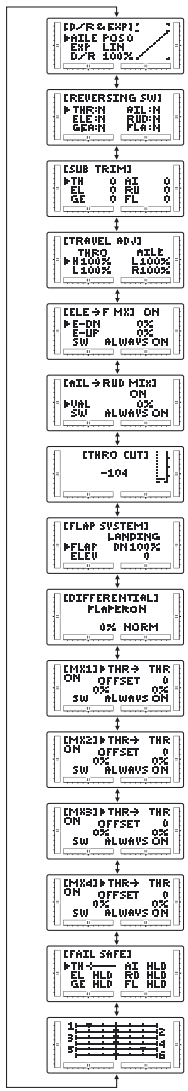
Function Mode Flowchart

Information pertaining to each function is explained on the page listed next to the function name. Functions will appear in the same order they are shown on this chart.

Accessing the Mode Function

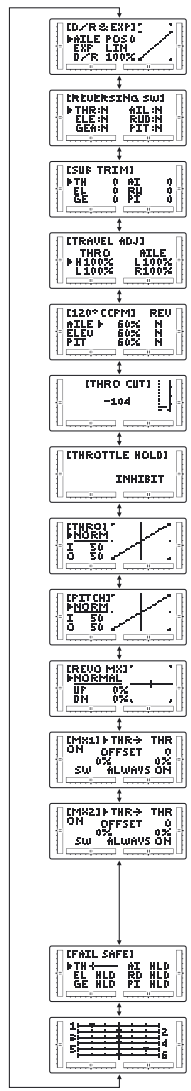
1. Move the power switch to the ON position.
2. Press the *Down* and *Select* keys simultaneously.
3. Use either the *Up* or *Down* to scroll through the menu and access the applicable function.

AIRPLANE



1. **D**ual **R**ate & **EXP**onential
2. **REVERSING SW**
3. **SUB TRIM**
4. **TRAVEL ADJ**ust
5. **ELE**v →Flap **MIX**ing
6. **AIL**e →**RUD**d **MIX**ing
7. **THRO**ttle **CUT**
8. **FLAP SYSTEM**
9. **DIFFERENTIAL**
   (Only in Wing type)
10. Program **MiX**ing 1
10. Program **MiX**ing 2
10. Program **MiX**ing 3
10. Program **MiX**ing 4
11. **FAIL SAFE**
    (Only in SPCM)
12. Servo Travel Screen

HELICOPTER



13. Dual Rate & **EXP**onential
14. **REVERSING SW**
15. **SUB TRIM**
16. **TRAVEL ADJ**ust
17. Swash Mixing
    (Over 2 servos in Swashplate type
18. **THRO**ttle **CUT**
19. **THROTTLE HOLD**
20. **THRO** Curve
21. **PITCH** Curve
22. **REVO**lusion **MiX**ing
23. Program **MiX**ing 1
23. Program **MiX**ing 2
24. **FAIL SAFE**
    (Only in SPCM)
25. Servo Travel Screen

System mode

To enter the System mode, press the *Down* and *Select* keys simultaneously, then turn the power switch to the ON position. The display will show the last active program. Pressing either the *Up* or *Down* key then scrolls through the functions one by one, according to the system mode flowchart is shown to the right. Once the appropriate function is displayed, changes can be made by pressing the (+) or (-) keys.

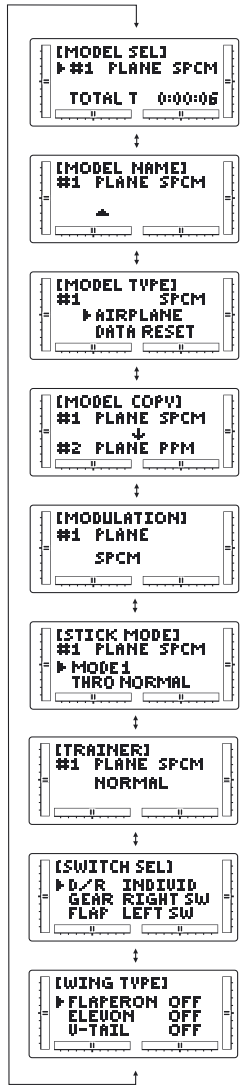
System Mode Flowchart

Information pertaining to each function is explained on the page listed next to the function name. Functions will appear in the same order they are shown on this chart.

Accessing the System Mode

1. Press the *Down* and *Select* keys simultaneously.
2. Move the power switch to the ON (upper) position.
3. Use either the *Up* or *Down* key to scroll through the menu and access the applicable function.

AIRPLANE



26. **MODEL SEL**ect

27. **MODEL NAME**

28. **MODEL TYPE**
& Data reset

29. **MODEL COPY**

30. **MODULATION**

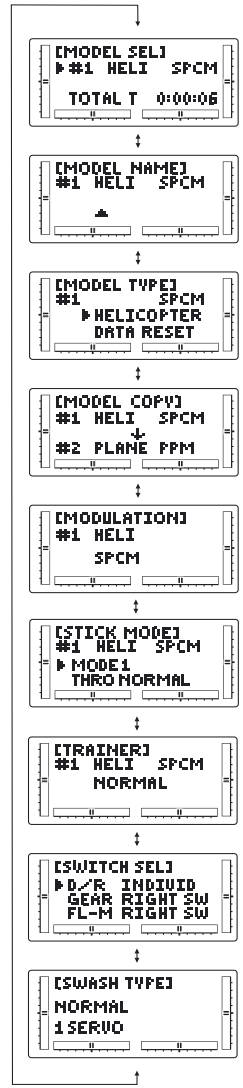
31. **STICK MODE**

32. **TRAINER**

33. **SWITCH SEL**ect

34. **WING TYPE**

HELICOPTER



26. **MODEL SEL**ect

27. **MODEL NAME**

28. **MODEL TYPE**
& Data reset

29. **MODEL COPY**

30. **MODULATION**

31. **STICK MODE**

32. **TRAINER**

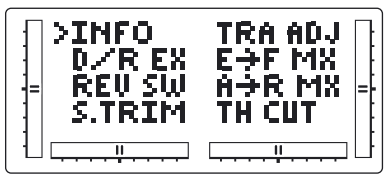
33. **SWITCH SEL**ect

34. **SWASH TYPE**

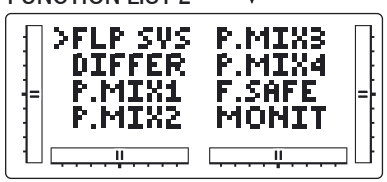
List mode

To enter the Function List mode from the Function mode, switch the transmitter power switch to the ON position. Press the *Up* und *Select* keys simultaneously. To scroll the functions, first press the *Down* and *Select* keys.

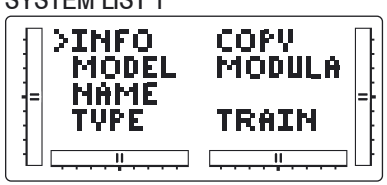
FUNCTION LIST 1



FUNCTION LIST 2



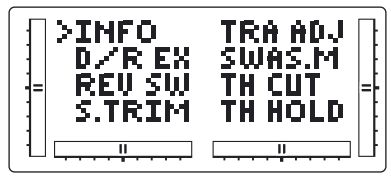
SYSTEM LIST 1



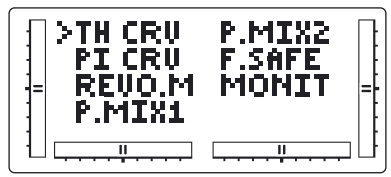
SYSTEM LIST 2

HELICOPTER

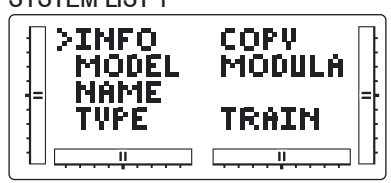
FUNCTION LIST 1



FUNCTION LIST 2



SYSTEM LIST 1

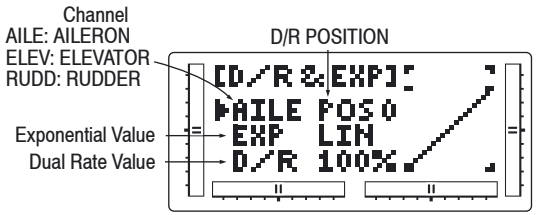


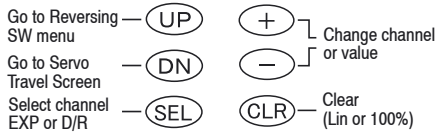
SYSTEM LIST 2

Function mode AIRPLANE

Dual Rates and Exponential; Servo Reversing

Dual Rates and Exponential





Dual rates are available for the aileron, elevator and rudder channels of yor R/C aircraft. The combined Dual Rate Function is discussed at page XX. Dual rates may be defined as the ability to vary the travel or throw rate of a servo from a switch. Due to the differing travel rates, you will find that the sensitivity of the control either increases or decreases accordingly. A higher rate, or travel, yields a higher overall sensitivity. You may find it easier to think of the Dual-Rate function as double-rates or half-rates.

The amount of travel is adjustable from 0-125% in 1% increments. The factory setting, or default value, for both the 0 and 1 switch positions is 100%.

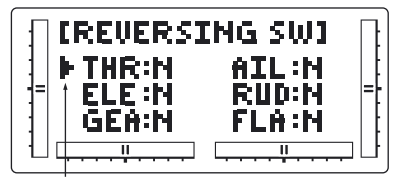
Exponential reduces the sensitivity in the middle portion of stick movement, while still allowing full travel at the end of the stick movement. The end result (travel) remains the same, although exponential changes the rate at which it achieves this travel. The adjustable range is from 0-100%. Zero percent (0%) is linear stick control, meaning the response rate is equal throughout the stick control. 100% is full exponential. The larger the exponential value, the less servo action or sensitivity you will notice around the neutral setting.

Either switch position may be selected as the low or high rate by placing the switch in the desired position and adjusting the value accordingly.

Accessing the Dual-Rate and Exponential Function

1. Place the transmitter power switchin the ON position.
2. Access the Function mode by pressing the *Down* and *Select* keys simultaneously.
3. Press either the *Up* or *Down* key until **D/R EXP** appears in the upper left corner of the LCD.
4. Press the (+) ir (-) key until the desired channel (aileron, elevator or rudder) appears.
5. Select the switch position for which you want to adjust the rate. The number to the upper right of the current rate value on the display indicates the current position of the Dual-Rate switch for the channel that you have selected. Either a 0 or a 1 will be shown, corresponding to the position of the switch. To select the opposite switch positio, move the appropriate Dual Rate switch to the opposite position. The number that appears above the current rate value reflects the change.
6. Adjust the rate for the channel and the switch position just selected. To decrease the throw rate, move the cursor to the D/R position using the *Select* key, then press the (-) key. To increase the throw rate, press the (+) key. As stated previously, the adjustable rate is from 0-125% for each switch position and channel.
7. Press the *Up* arrow key to access the **REVERSING SW** menu.
8. Press the *Down* arrow key to access the **SERVO TRAVEL SCREEN.**
9. Press the *Down* arrow and *Select* keys simultaneously to exit the **DUAL RATE AND EXPONENTIAL** mode.

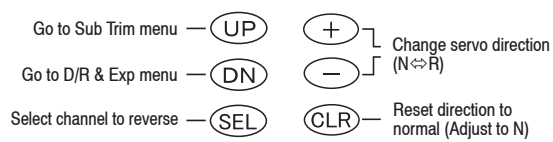
Servo Reversing



Channel being programmed

THR	1: THROTTLE
AIL	2: AILERON
ELE	3: ELEVATOR
RUD	4: RUDDER
GEA	5: GEAR
FLA	6: FLAP

The Reverse Switch function is an electronic means of reversing the throw of a given channel (servo). All six channels of the mx-12 offer reversible servo direction. This will ease setup during the servo installation into your aircraft.



Accessing the Travel Adjust Function

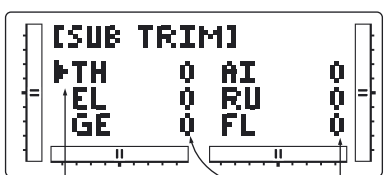
1. Place the transmitter power switch in the ON position.
2. Access the Function mode by pressing the *Down* and *Select* keys simultaneously.

Function mode AIRPLANE

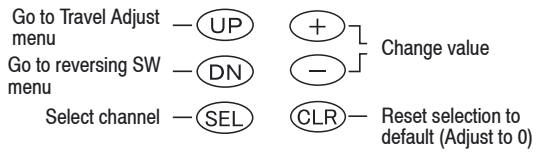
Sub Trim; Travel Adjust

3. Press either the *Up* or *Down* key until **TRAVEL ADJ** appears in the upper portion of the LCD.
4. Using your transmitter`s control sticks, switches and potentiometers, move the control surfaces of your aircraft. Note the travel direction of each of the corresponding control surfaces.
5. After you have determined which channel(s) need to have the throw directions reversed, use the *Select* key to call up the appropriate channel.
6. Press either the (+) or (-) keys to change the travel directions of the servo. Pressing the Clear key returns the travel direction to Normal.
7. You can observe the change in the travel direction by moving the appropriate control at this time.
8. Access the **D/R & EXP** function by pressing the *Down* key.
9. Access the **SUB TRIM** function by pressing the *Up* key.
10. Exit the **SERVO REVERSING** function by pressing the *Down* and *Select* keys simultaneously.

Sub Trim



The Sub Trim Adjustment function allows you to electronically fine-tune the centering of your servos. Individually adjustable for all six channels with a range of +/- 125% (+/- 30 degrees servo travel).
The sub trim function provides precise servo arm neutral positioning if rotating the servo arm will not allow the desired servo arm position.



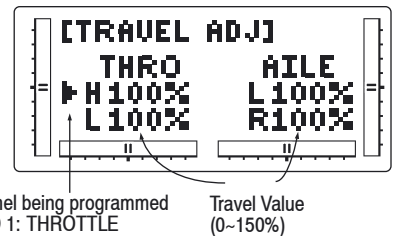
Accessing the Sub Trim Function

1. Place the transmitter power switch in the ON position.
2. To Access the Function mode, press the *Down* and *Select* keys simultaneously.
3. Press either the *Up* or *Down* key until **SUB TRIM** appears in the upper middle portion of the LCD.
4. Press the *Select* key until the desired channel appears.
5. Press the (+) or (-) key to establish the desired amount and direction of Sub Trim.

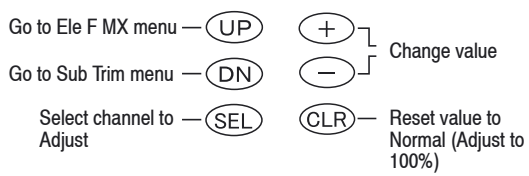
Caution: Do not use excessive Sub Trim adjustments since it is possible to overrun your servo`s maximum Sub Trim. Remember that it is a trim convenience function.
It is not intended to take the place of the proper mechanical trim adjustments that are necessary on any RC model.

6. Access the **REVERSING SW** function by pressing the *Down* key.
7. Access the **TRAVEL ADJ** function by pressing the *Down* key.
8. Exit the **SUB TRIM** function by pressing the *Down* and *Select* keys simultaneously.

Travel Adjust



The purpose of Travel Adjust is to offer you precise servo control deflection in either direction of servo operation. The mx-12 offers travel adjust for all six channels. The Travel Adjust range is from 0-150% (0 degrees to 60 degrees) from neutral, or center, and it can be adjusted for each direction inividually. The factory default (Data Reset) value is 100% for each direction of servo travel.



Accessing the Travel Adjust Function

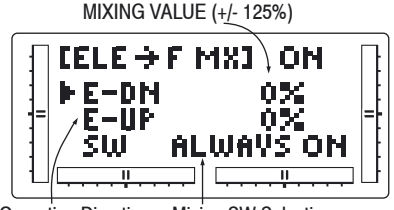
1. Place the transmitter power switch in the ON position.
2. Access the Function mode by pressing the *Down* and *Select* keys simultaneously.
3. Press either the *Up* or *Down* key until **TRAVEL ADJ** appears in the upper portion of the LCD.
4. Press the *Select* key until the desired channel is

highlighted.

5. Move the appropriate control stick (lever, switch, etc.) to the right or left of center to the direction of travel you want to adjust. An arrow to the left of the travel adjust value will reflect the current position to be adjusted.
6. After the control stick or switch is placed in the direction of travel to be adjusted, press the (+) or (-) key until the proper amount of servo travel is shown on the LCD. Press the (+) key to increase the amount of servo travel. Press the (-) key to decrease the amount of servo travel.
7. Follow the same procedure for the remaining channels.
8. Access the **SUB TRIM** function by pressing the *Down* key.
9. Access the **ELE →F MX** function by pressing the *Up* key.
10. Exit the **TRAVEL ADJ** function by pressing the *Down* and *Select* keys simultaneously.

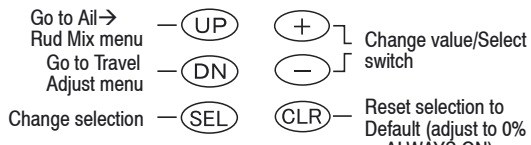
Elevator to flap mixing

When this system is active and a value of flaps is input, the flaps will be deflected each time the elevator stick is used. The actual flap movement is adjustable for both up and down elevator. A switch can be assigned to turn the elevator to flap mixing on or off.



Elevator Operating Direction
E-DN: Down side
E-UP: Up side

Mixing SW Selection
SW Display
ALWAYS ON: Always Mixing In
RIGHT FWD: Gear SW Forward side →On
RIGHT REA: Gear SW Rear side→On
LEFT FWD: FLAP SW Forward side→On
LEFT REA: FLAP SW Rear side→On
AILE D/R: AILE D/R SW Position 1→On
ELEV D/R: ELEV D/R SW Position 1→On



Accessing the Elevator to Flap Function

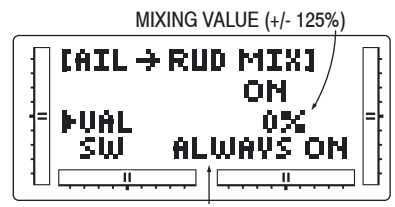
1. Place the transmitter power switch on the ON position.
2. Access the Function mode. To do so, press the *Down* and *Select* keys simultaneously.
3. Move the elevator stick in the direction you want to mix with flaps.

Note: The position indicator will reflect this change by highlighting the up or down arrow.

4. Press the (+) or (-) key to increase or decrease the amount of flaps to be mixed. If you want to reverse the flap travel, press the Clear key, bringing the mixing value to the factory default (0%), and increase the value using the opposite key (+) or (-) from the key originally selected.
5. Once you have adjusted the first mixing position (up or down), place the elevator stick in the opposite direction and follow Step 5 above to adjust the second elevator mixing value.
6. Access the switch position by pressing the *Select* key. Use the (+) or (-) keys to select from the one of six switches, or from always on.
7. Access the **TRAVEL ADJ** function by pressing the *Up* key.
8. Access the **AIL →RUD MIX** Mixing function by pressing the Up key.
9. Exit the **ELE →F MX** function by pressing the *Down* and *Channel* keys simultaneously.

Aileron to rudder mixing

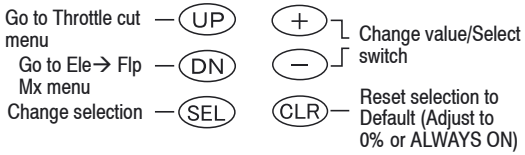
This form of mixing is designed so that when input to the aileron stick is given, the rudder servo will also move, eliminating the need to coordinate these controls manually. When adjusting, if an opposite mixing direction of the rudder servo is required, simply press the (+) or (-) keys to change the mixing value from a (+) or (-). This will reverse the mixing direction of the rudder from its original direction. The switch used to activate this mix can also be selected as explained below. The factory default is a value of 0%



Mixing SW Selection
SW Display
ALWAYS ON: Always Mixing In
RIGHT FWD: Gear SW Forward side →On
RIGHT REA: Gear SW Rear side→On
LEFT FWD: FLAP SW Rear side→On
LEFT REA: FLAP SW Rear side→On
AILE D/R: AILE D/R SW Position 1→On
ELEV D/R: ELEV D/R SW Position 1→On

Function mode AIRPLANE

Throttle Cut switch; Flap System

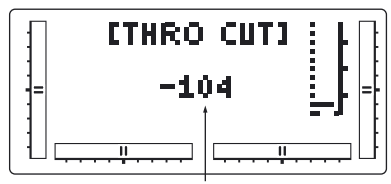


Accessing the Aileron to Rudder Mixing Function

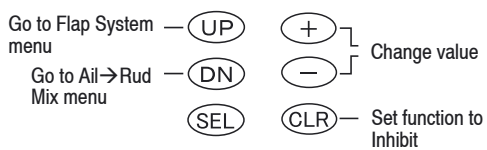
1. Place the transmitter power switch in the ON position.
2. Access the Function mode. To do so, press the *Down* and *Select* keys simultaneously. Press either the *Up* or *Down* key until **AIL→RUD MIX** appears in the center portion of your LCD.
3. Press the (+) or (-) key to increase or decrease the amount of rudder to be mixed with aileron. If you want to reverse the Rudder Mix direction, press the *Clear* key, bringing the mixing value to the factory default (0%), and increase the value using the opposite key (+) ir (-) from the key originally selected.
4. Press the *Select* key to access the switch assignment function.
5. Press the (+) or (-) key to select the desired switch/function to activate the Aileron-to-Rudder Mixing function.
6. Access the **ELE→FLP MX** mixing function by pressing the *Down* key.
7. Access the **THRO CUT** function by pressing the *Up* key.
8. Exit the **AIL→RUD MIX** function by pressing the *Down* and *Select* keys simultaneously.

Throttle Cut switch

This function assigns the Throttle Cut switch to the push button located on upper right front of the transmitter. The Throttle Cut function is designed to return the throttle trim to the lowest position instantly and keep this position while the button is pressed. This feature is used to "cut" or stop the engine without changing the position of digital throttle trim.



Throttle cut operating position (-32~-128)



Accessing the Throttle Cut Function

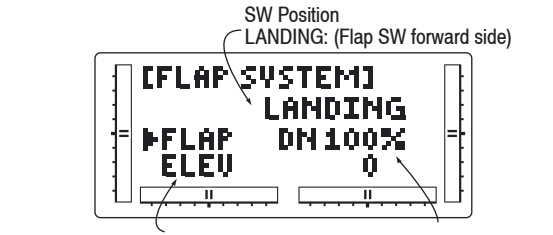
1. Place the transmitter power switch on the ON position.
2. Access the Function mode. To do so, press the *Down* and *Select* keys simultaneously. Press either the *Up* or *Down* key, until **THRO CUT** appears in the upper portion of the LCD screen.
3. Use the (+) and (-) keys to change the value of the Throttle cut function.

Note: Pressing the Clear key will Inhibit the Throttle Cut, turning it off until it has been reactivated.

4. Access the **FLAP SYSTEM** mixing function by pressing the *Down* key.
5. Access the **AIL→RUD MIX** function by pressing the *Up* key.
6. Exit the **THRO CUT** function by pressing the *Down* and *Select* keys simultaneously.

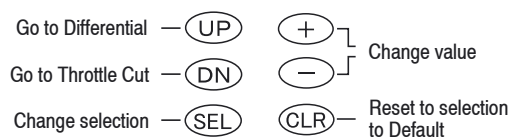
Flap System

The Flap System function provides elevator compensation to counteract any pitch tendencies when flaps are deployed.



Elevator Offset value Travel value (DN200~0~UP200)

Flap operating value Travel value (DN125%~0%~UP125%)



Accessing the Flap System Function

1. Place the transmitter switch in the ON position.
2. Press the *Down* and *Select* keys simultanously to enter the Function mode.
3. Press either the *Up* or *Down* key until **FLAP SYSTEM** appears in the top of the LCD.
4. Press the *Select* key to select the desired channels to be adjusted.
5. Use the (+) or (-) keys to set the desired landing mode surface positions.
6. Access the **THRO CUT** mixing function by pressing

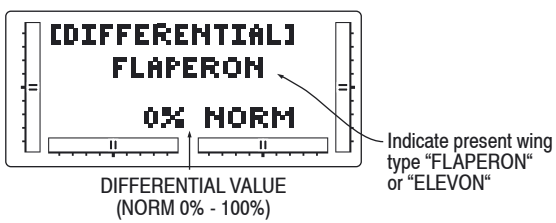
the *Down* key.

7. Access the **MIX 1** function by pressing the *Up* key.
8. Exit the **FLAP SYSTEM** function by pressing the *Down* and *Select* keys simultaneously.

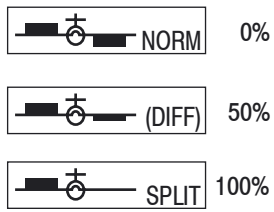
Differential aileron mixing

In order to use the Differential Function, flaperon or elevon (Delta), wing mixing must be selected in the Model Set-Up Mode and two servos must be used to operate the ailerons (one on each). In the Function Mode, use the UP or DN key to select Differential Aileron Mixing and access by pressing the UP and DN keys simultanously.

Note: The Differential Aileron Mixing Function will only be shown in the Function Model if either Flaperon or Delta wing types have been previously selected in the System Mode.



Differential Value



Programmable Mixing (1~4)

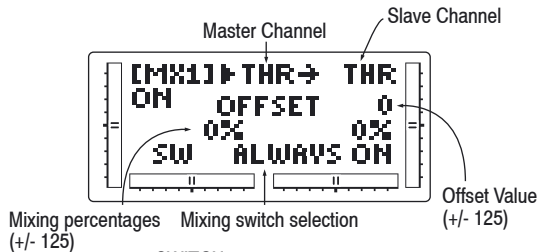
The mx-12 offers four programmable mixes to be used for any number of different purposes. This function allows mixing any one channel to any other channel. This mix can remain on at all times or be switched on and off in flight using a number of different switches.

Mix numbers 1-3 are of the standard variety, in that the digital trim for the master channel only affect the master channel, and not the slave channel. Mix number 4 is of the "Trim Include" variety. This mix is used any time the mix requires the slave channels trim position to be varied when the master channels digital trim position is varied. An example for this type of mix would be when dual elevator or dual aileron servos are used and connected to two separate channels of the system, rather than using a single channel with a Y-harness.

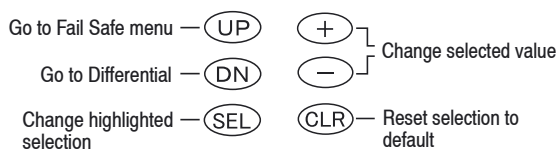
Each channel of this radio is identified by an abbreviated name. The chart below indicates the channel and its corresponding abbreviation. The channel name appearing first is known as the "master channel" or the channel to which you want to mix. The second number is known as the "slave channel" or the channel that is being mixed into the master channel. For example, AIL→RUD would indicate aileron-to-rudder mixing.

Each time the aileron stick is moved, the aileron will deflect, and the rudder will automatically move in the direction and to the value input. Mixing is proportional, so small inputs of the master channel will produce small outputs of the slave channel. Each programmable mix has a mixing "offset". The purpose of the mixing offset is to re-define the neutral position of the slave channel.

Accessing the Programmable Mixing Function



SWITCH	
ALWAYS ON:	Always Mixing On
RIGHT FWD:	Gear SW Forward side→On
RIGHT REA:	Gear SW Rear side→On
LEFT FWD:	FLAP SW Forward side→On
LEFT REA:	FLAP SW Rear side→On
AILE D/R:	AILE D/R SW Position 1→On
ELEV D/R:	ELEV D/R SW Position 1→On



Function mode AIRPLANE

Fail Safe

Accessing the Programmable Mixing Function

1. Place the transmitter switch in the ON position.
2. Press the *Down* and *Select* keys simultaneously to enter the Function mode.
3. Press either the *Up* or *Down* key until MIX 1 appears in the LCD.

Selecting the Master and Slave Mixing Channels

4. Press the (+) or (-) keys to select the master channel.
5. Press the *Select* key to move the cursor to the slave channel position.
6. Press the (+) or (-) keys to select the slave channel.
7. Press the *Select* key once. The display will continue to show the current mixing channels at the top of the LCD, but now an arrow will indicate the current stick position (master) to be adjusted.

Setting the Mixing Values

8. While holding the master stick in the direction you want to mix, press the (+) or (-) keys to increase or decrease the mixing value for the slave channel. The value in the LCD will change to display the current mix value selected. Next, hold the master stick to the other side to adjust the mix for the other direction.

Setting the Mixing Switch Activation

9. Press the *Select* key until the SW is highlighted. The LCD with "ALWAYS ON" indicates the current switch that this mix is currently selected to always be active (ON).

Mixing Operation and Switches

Each mixing program can be turned on and off by a lever or switch. The levers and switches that can be selected for program mixing are tabulated at the right with their abbreviations appearing on the displayand their corresponding positions.

Setting the Mixing Channel Offset

1. Press the Select key until offset is highlighted. The display will show the current mixing channels at the top of the LCD, with the word "OFFSET" in the center of the LCD. The value to the right is the mixing Offset neutral point, currently 0.
2. A new value for the offset can be selected using the (+) or (-) keys. This is the new neutral point for the slave channel (Point that the mix is activated). Press the *Clear* key to reset the value back to 0.
3. Press the *Down* and *Select* keys simultaneously to exit the Programmable Mix function.

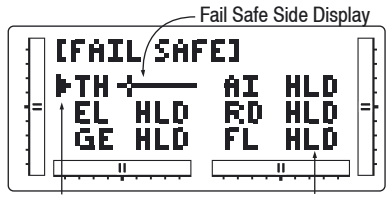
With a little practice, programmable mixing will become easier to understand. Mixing is inly limited by your imagination.

Fail Safe

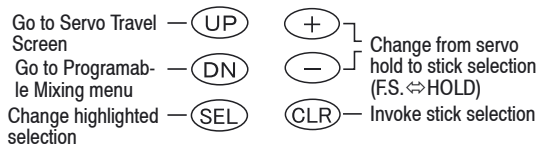
The Fail Safe/Hold function is available only when you use the mx-12 transmitter in PCM modulations. This function is designed to help minimize damage to your aircraft during a loss of signal to the receiver. The servos either assume the fail-safe presets or hold their last good signal position.

As noted earlier, if you are in the PPM modulation, the Fail-Safe/Hold function is not applicable. Therefore, the Fail-Safe/Hold function will not appear on your LCD screen menu while in the PPM mode. Refer to the Modulation Selection section for more information pertaining to the broadcast signal of your mx-12 transmitter.

Note: The throttle fail safe position is defaulted to the idle position for added safety.



TH Throttle
AI Aileron
EL Elevator
RU Rudder
GE Gear
FL Flap



Accessing the Fail Safe Function

1. Place the transmitter power switch in the ON position.
2. Access the Function mode. To do so, press the *Down* and *Select* keys simultaneously. Press either the *Up* or *Down* key until **FAIL SAFE** appears in the upper portion of the LCD screen.
3. Use the *Select* key to highlight the servo function to set.
4. Use the (+) or (-) keys to toggle between servo hold or setting the servo position.
5. When using the servo setting position, move the corresponding control stick to the position where you want the servo if the radio enters into the fail safe mode. Press the Clear key to have the transmitter memorize all stick position.
6. Repeat steps 4 and 5 intil all six controls have been set.
7. Access the **SERVO TRAVEL** screen by pressing the

Function mode AIRPLANE

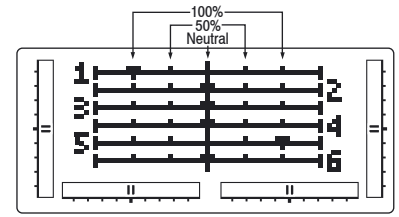
Servo Travel Screen

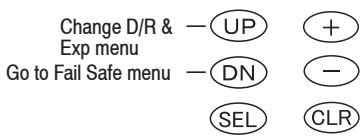
Up key.

8. Access the **MIXING FUNCTIONS** function by pressing the *Up* key.
9. Exit the **FAIL SAFE** function by pressing the *Down* and *Select* keys simultaneously.

Servo Travel Screen

The Servo Travel Screen is used to verify the stick movements of the transmitter. It can also be used to verify the mixing functions have been performed correctly without the need to turn on the aircraft.





Accessing the Servo Travel Screen

1. Place the transmitter power switch in the ON position.
2. Access the Function mode. To do so, press the *Down* and *Select* keys simultaneously. Press either the *Up* or *Down* key until the **SERVO TRAVEL** screen appears.
3. Move the sticks. The indicators correspond to the following:

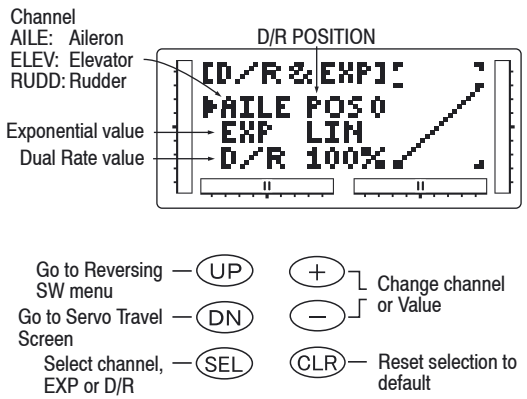
Indicator 1: Throttle
Indicator 2: Aileron
Indicator 3: Elevator
Indicator 4: Rudder
Indicator 5: Gear
Indicator 6: Flap

4. Access the **D/R & EXP** screen by pressing the *Up* key.
5. Access the **FAIL SAFE** function by pressing the *Up* key.
6. Exit the **SERVO TRAVEL** screen function by pressing the *Down* and *Select* keys simultaneously.

Function mode HELICOPTER

Dual Rate and Exponential; Servo Reversing

Dual Rates and Exponential



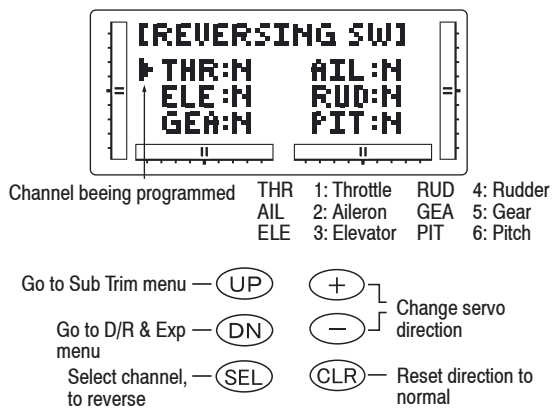
Dual rates are availabe for the aileron, elevator and rudder channels of your RC aircraft.
Dual rates may be defined as the ability to vary the travel or throw rate of a servo from a switch. Due to the differing travel rates, you will find that the sensitivity of the control either increases or decreases accordingly. A higher rate, or travel, yields a higher overall sensitivity. You may find it easier to think of the Dual-Rate function as double-rates or half-rates.
The amount of travel is adjustable from 0-125% in 1% increments. The factory setting, or default value, for both the 0 and 1 switch positions is 100%.
Exponential reduces the sensitivity in the middle portion of stick movement, while still allowing full travel at the end of the stick movement. The end result (travel) remains the same, although exponential changes the rate at which it achieves this travel. The adjustable range is from 0-100%. Zero percent (0%) is linear stick control, meaning the response rate is equal throughout the stick control. 100% is full exponential. The larger the exponential value, the less servo action or sensitivity you will notice around the neutral setting.
Either switch position may be selected as the low or high rate by placing the switch in the desired position and adjusting the value accordingly.

Accessing the Dual Rate and Exponential Function

1. Place the transmitter power switch in the ON position.
2. Access the Function mode by pressing the *Down* and *Select* keys simultaneously.
3. Press either the *Up* or *Down* key intil **D/R & EXP** appears in the upper left corner of the LCD.
4. Press the (+) or (-) key until the desired channel (aileron) elevator or rudder) appears.
5. Select the switch position for which you want to adjust the rate. The number to the upper right of the current rate value on the display indicates the current position of the Dual-Rate switch for the channel that you have selected. Either a 0 or a 1 will be shown, corresponding to the position of the switch. To select the opposite switch Rate switch to the opposite position. The number that appears above the current rate value reflects the change.
6. Adjust the rate for the channel and the switch position just selected. To decrease the throw rate, move the cursor to the D/R position using the Select key, then press the (-) key. To increase the throw rate, press the (+) key. As stated previously, the adjustable rate is from 0-125% for each switch position and channel.
7. Press the *Up* arrow key to access the **REVERSING SW** menu.
8. Press the *Down* arrow key to access the **SERVO TRAVEL SCREEN**.
9. Press the Down arrow and Select keys simultaneously to exit the **DUAL RATE AND EXPONENTIAL** mode.

Servo Reversing

The Reverse Switch function is an electronic means of reversing the throw of a given channel (servo). All six channels of the mx-12 offer reversible servo direction. This will ease setup during the servo installation into your helicopter.



Accessing the Servo Reverse Function

1. Place the transmitter switch in the ON position.
2. Access the Function mode by pressing the *Down* and *Select* keys simultaneously.
3. Press either the *Up* or *Down* key until the **REVERSING SW** appears in the upper portion of the LCD.
4. Using your transmitter`s control sticks, switches and potentiometers, move the control surfaces on your aircraft. Note the travel direction of each of the

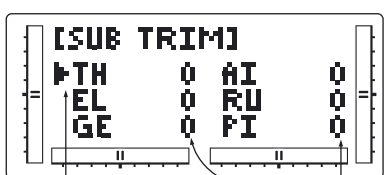
corresponding control surfaces.

5. After determining which channel(s) need to have the throw directions reversed, use the *Select* key to call up the appropriate channel.
6. Press either the (+) or (-) keys to change the travel direction of the servo. Pressing the Clear key returns the travel direction to Normal.
7. You can observe the change in the travel direction by moving the appropriate control at this time.
8. Access the **D/R & EXP** function by pressing the *Down* key.
9. Access the **SUB TRIM** function by pressing the *Up* key.
10. Exit the **SERVO REVERSING** function by pressing the *Down* and *Select* keys simultaneously.

Sub Trim

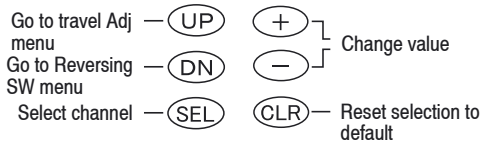
The Sub Trim Adjustment function allows you to electronically fine-tune the centering of your servos. Individually adjustable for all six channels with a range of +/-125% (+/- 30 degrees servo travel).

The sub trim functions provide precise servo arm neutral positioning if rotating the servo arm will not allow the desired servo arm position.



Channel beeing programmed
TH 1: Throttle
AI 2: Aileron
EL 3: Elevator
RU 4: Rudder
GE 5: Gear
PI 6: Pitch

Sub Trim Value (0~+/-125)



Accessing the Sub Trim Function

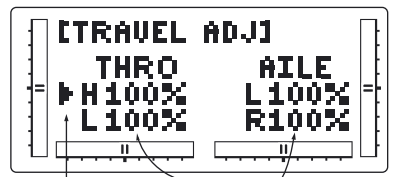
1. Place the transmitter power switch in the ON position.
2. To Access the Function mode, press the *Down* and *Select* keys simultaneously.
3. Press either the Up or Down key until SUB TRIM appears in the upper middle portion of the LCD.
4. Press the *Select* key until the desired channel appears.
5. Press the (+) or (-) key to establish the desired amount and direction of Sub-Trim.

Caution: Do not use excessive sub-trim adjustments since it is possible to overrun your servo`s maximum Sub Trim. Remember that it is a trim convenience function. It is not intended to take the place of the proper mechanical trim adjustments that are necessary on any RC model.

6. Access the **REVERSING SW** function by pressing the *Down* key.
7. Access the **TRAVEL ADJ** function by pressing the Up key.
8. Exit the **SUB TRIM** function by pressing the *Down* and *Select* keys simultaneously.

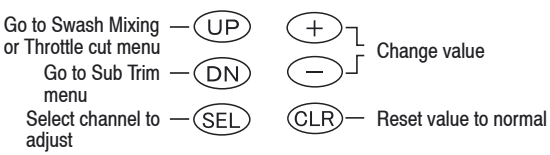
Travel Adjust

The purpose of Travel Adjust is to offer you precise servo control deflection in either direction of servo operation. The mx-12 offers travel adjust for all six channels. The Travel Adjust range is from 0-150% (0 degrees to 60 degrees) from neutral, or center, and it can be adjusted for each direction individually. The factory default (Data Reset) value is 100% for each direction of servo travel.



Channel beeing programmed
TH 1: Throttle
AI 2: Aileron
EL 3: Elevator
RU 4: Rudder
GE 5: Gear
PI 6: Pitch

Travel value (0~150%)



Accessing the Travel Adjust Function

1. Place the transmitter power switch in the ON position
2. Access the Function mode by pressing the *Down* and *Select* keys simultaneously.
3. Press either the *Up* or *Down* key until **TRAVEL ADJ** appears in the upper portion of the LCD.
4. Press the Select key until the desired channel is highlighted.
5. Move the appropriate control stick (lever, switch, etc.) to right or left of the center to the direction of travel you want to adjust value will reflect the current position to be adjusted
6. After the control stick or switch is placed in the dir-

Function mode HELICOPTER

CCPM Swashplate Mixing

ection of travel to be adjusted, press the (+) or (-) key until the proper amount of servo travel is shown on the LCD. Press the (+) key to increase the amount of servo travel. Press the (-) key to decrease the amount of servo travel.

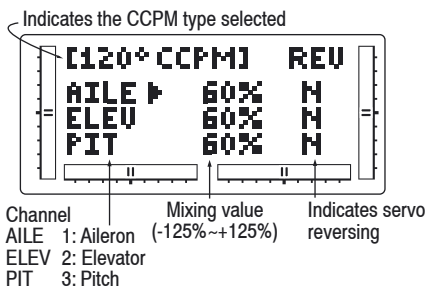
7. Follow the same procedure for the remaining channels.
8. Access the **SUB TRIM** function by pressing the *Down* key.
9. Access the **THROTTLE CUT** function by pressing the Up key.
10. Exit the **TRAVEL ADJ** function by pressing the *Down* and *Select* keys simultaneously.

CCPM Swashplate Mixing

The CCPM Swashplate Mixing Function (Cyclic Collective Pitch Mixing) of the mx-12 is designed to be used in model helicopters that utilize 2-servo (180°), 3-servo (120°) and 3-servo (90°) type swashplate control system.

The desired swashplate mixing type must first be selected at the Swash Type Selection in System Mode.

If the Swashplate Type option has not been selected, proceed to Throttle Cut section.



Go to the Throttle Cut menu — UP

Go to the Travel Adjustment menu — DN

Return highlighted value to default — SEL

+ / − — Increase/decrease value or change reversing value

CLR — Return highlited value to default

Note: The CCPM Swashplate Mixing screen is only displayed when Swashplate types 2Serv, 3Serv, or 4Serv CCPM are selected in the Swashplate type Selection in System Mode.

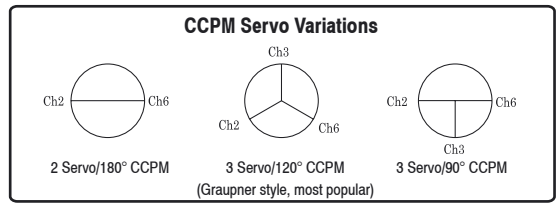
Accessing the Swashplate Type

1. Place the transmitter power switch in the ON position.
2. Access the Function Mode by pressing the *Down* and *Select* keys simultaneously.
3. Press either the Up or Down key until 90° CCPM, 120° CCPM or 180° CCPM appears in the middle left portion of the LCD.

Note: The swashplate type selection is selected in the System mode on Page XX.

4. Press the Select key until the desired function is highlighted.
5. Press the (+) or (-) Keys to Increase or Decrease the CCPM Values.
6. Follow the same procedure for the remaining channels.
7. Access the **TRAVEL ADJ** function by pressing the *Down* key.
8. Access the **THROTTLE CUT** function by pressing the *Up* key.
9. Exit the **CCPM SETUP** screen by pressing the *Down* and *Select* keys simultaneously.

CCPM is a type of pitch mixing where the two or three servos are connected directly to the swashplate of the helicopter and physically move together and independently for all changes in pitch/cyclic. Please refer to the diagram below.



1.) **One servo (Standard Mechanical Miying)**
The most common form of Swashplate Mixing. This type uses each of the three servo to move the swashplate individually for pitch, Aileron and Elevator changes. If one servo (NORM) is selected in the System Mode (Factory Default), the Swashplate Type Function will not appear on the LCD screen in this section.

2.) **Two servo (180-degrees)**
Two servos are used to move the swashplate, and are spaced at 180 degrees apart. This is not a very common control system configuration.

3.) **Three servo (120-degrees)**
Three servos are used to move the swashplate , and are spaced at 120 degrees apart. This is the most common form of CCPM, and is found in Graupner and other brands of Helicopters.

4.) **Three servo (90-degrees)**
Three servos are used to move the swashplate, and are spaced at 90 degrees apart. This is also not a very common control system configuration.

CCPM Servo Connection/Channel Numbers

2 servo (180°)
Ch2 = Aileron
Ch2 = Elevator

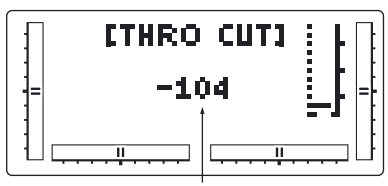
Function mode HELICOPTER

Throttle Cut Switch; Throttle Hold

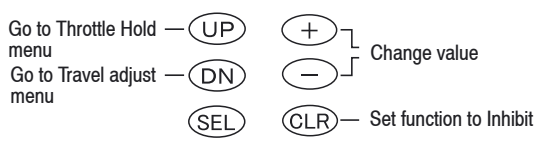
Ch6 = Pitch
3 servo (120°)
Ch2 = Aileron
Ch2 = Elevator
Ch6 = Pitch

Throttle Cut Switch

This function assigns the Throttle Cut switch to the push button located on upper right front of the transmitter. The Throttle Cut function is designed to return the throttle trim to the lowest position instantly and keep this position while the button is pressed. This feature is used to "cut" or stop the engine without changing the position of digital throttle trim.



Throttle Cut Operating position
(-32~-128)



Accessing the Throttle Cut Function

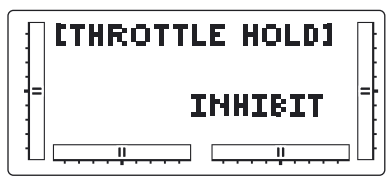
1. Place the transmitter power switch in the ON position.
2. Access the Function mode. To do so, press the *Down* ans *Select* keys simultaneously. Press either the *Up* or *Down* key until **THRO CUT** appears in the upper portion of the LCD screen.
3. Us the (+) and (-) keys to change the value of the Throttle cut function.

Note: Pressing the Clear key will Inhibit the Throttle Cut, turning it off until it has been reactivated.

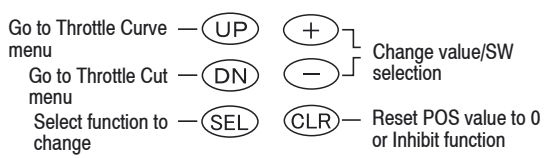
4. Access the **TRAVEL ADJ** mixing function by pressing the *Down* key.
5. Access the **THROTTLE HOLD** function by pressing the *Up* key.
6. Exit the **THRO CUT** function by pressing the *Down* and *Select* keys simultaneously.

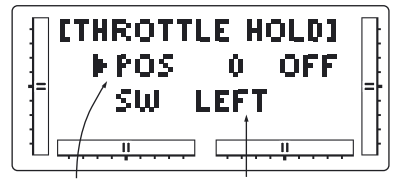
Throttle Hold

The Throttle Hold function is designed to hold the throttle servo in a specific position during an autorotation. This is very useful for practicing autorotation landings. The throttle hold switch can be programmed to one of the four toggle switches. Throttle hold will always be "On" in the forward switch position and "Off" in the rear position.



Press +/- key
Press CLR key during selecting SW





Throttle Hold Position (-20~50)
Hold SW Select

Switch
LEFT : THRO HOLD SW Forward Side→On
AILE D/R : AILE D/R: AILE D/R SW Position 1→On
ELEV D/R: ELEV D/R Position 1→On
RIGHT : FLIGHT MODE SW Forward Side→On

Accessing the Throttle Hold Function

1. Place the transmitter power switch in the ON position.
2. Press the *Down* and *Select* keys simultaneously to enter the Function mode.
3. Press either the *Up* or *Down* key until **THROTTLE HOLD** appears across the top of the LCD.
4. The factory setting for the throttle hold is inhibit. Pressing either the (+) or (-) key will activate Throttle Hold and display the current throttle hold value.
5. Using the (+) or (-) key, adjust the throttle hold value to deliver the proper engine idle rpm for your helicopter. The adjustable range is (-20% -/+ 50%). Once you establish the proper idle value for your engine, you can use this value for throttle hold as well. To shut the engine off for autorotation, a negative or zero value should be input.

Note: When the throttle hold is activated, and the switch is on, the indicator on the LCD will change from Off to On. In addition, the throttle trim indicator will be inhibited.

6. Access the **THROTTLE CURVE** function by pressing the *Up* key.

Function mode HELICOPTER

Throttle Curves

7. Access the **THROTTLE CUT** function by pressing the *Down* key.
8. To exit the **THROTTLE HOLD** function, press the *Down* and *Select* keys simultaneously.

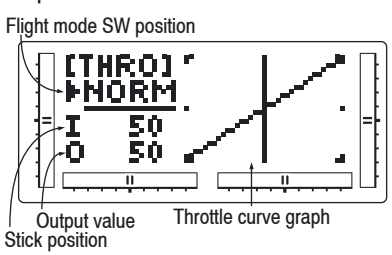
Throttle Curves

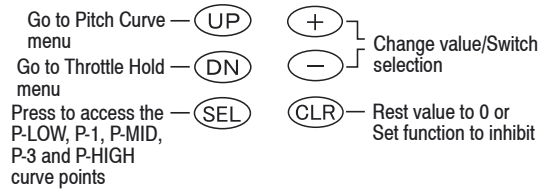
The mx-12 offers two (2) separate throttle curves with five adjustable points per curve. This function allows you to customize the throttle curve and pitch curve together to maximize engine performance at a particular pitch setting. Once the throttle curves are established, each can be activated in flight using the two (2) position flight mode switch.

The flight mode switch offers two selectable ranges: Normal and Stunt. The Normal position should be used as the hover throttle curve. The Stunt position should be used for aerobatic maneuvers and forward flight.

Note: The throttle trim and hovering throttle levers are only operable when the flight mode switch is in the normal position. Thus, in normal function it will have no effect. Also, adjusting the hovering throttle lever and throttle trim has no effect on the input values of the throttle curve.

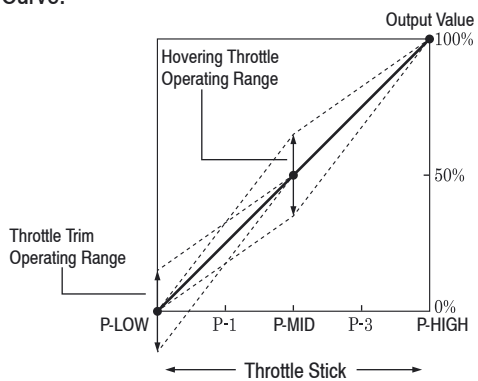
Each of the five points of the throttle curve are independently adjustable from 0-100%. These five points correspond to the position of the throttle stick. The illustration below shows the normal throttle curve setting for the dead slow position with throttle trim at default.





The transmitter is factory preset to the throttle curve as indicated by the solid line in the figure at right. Individual middle points can be increased or decreased to suit your specific needs.

The throttle trim lever position will affect the low-point position as shown when in the Normal mode Throttle Curve.



Accessing the Throttle Curve Function

1. Place the transmitter power switch in the ON position.
2. Press the *Down* and *Select* keys simultaneously to enter the Function mode.
3. Press either the Up or Down key until THRO appears in the upper portion of LCD.

Note: Use NORM for hover curves and STUNT for aerobatics. We will concentrate on the hovering curve during this example.

4. Press the *Select* key to select the point of the curve you want to change.
5. Press either the (+) or (-) key to change the value of the current curve point. The range of each point is 0-100% in 0,5% intervals.

Note: In each curve, the factory setting indicates INH for points 1 and 3. These values are 25% and 75% respectively if no value changes are made to any other points. If any of the other points have been changed while these points were inhibited, the inhibited points will also change to plot a smooth curve. If you want to keep this from happening, press the *Select* key until the display indicates P-1 or P-3 at the upper right portion of the LCD. Press either the (+) or (-) key to activate the points 1 (25%) or 3 (75%). The values for each of these curves can then be fully adjusted by pressing either the (+) or (-) key.

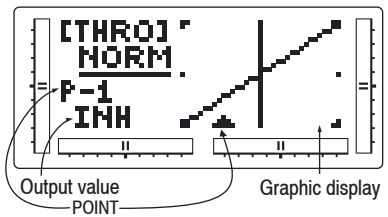
6. To set curves for STUNT mode, press the *Select* to highlight the NORM function, then press the (+) or (-) key to select the STUNT function. Repeat Steps 4 and 5 to complete the procedure.
7. Access the **PITCH CURVE** function by pressing the *Up* key.
8. Access the **THROTTLE HOLD** function by pressing the *Down* key.
9. Exit the **THROTTLE CURVE** function by pressing the *Down* and *Select* keys simultaneously.

Throttle Time Settings

The throttle trim lever is only active when the flight mode switch is in the normal position. The throttle trim is used to increase or decrease the engine power when the flight mode switch is in the Normal mode. The throttle

trim lever has no effect on positions 1 or throttle hold.

Note: Making changes to the throttle trim lever does not change the input values for any of the points on the throttle curve; it merely makes adjustments to the engine idle speed postition.



P-LOW : Full Slow position
P-1 : Stick 1/4 position
P-MID : Stick Center position
P-3 : Stick 3/4 position
P-HIGH : Full High position
* Point position is fixed

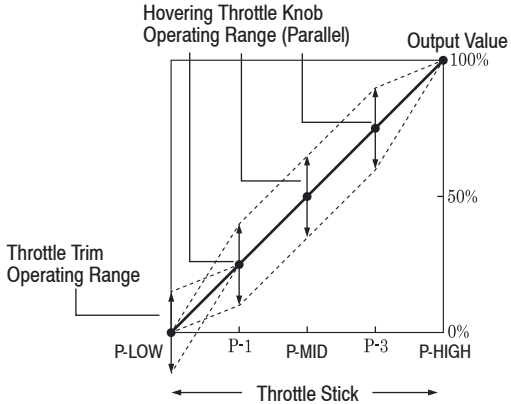
Hovering Throttle Lever Settings

The Hovering Throttle lever increases or decrease the engine output power for the middle three points set for the middle three points set for the throttle curve. As shown in the figure below, use of the hovering throttle lever shifts the curve upward or downward parallel with the original curve. Therefore, operation of the hovering throttle knob does not cause any change to the original settings of the throttle curve.

The throttle trim range will affect the throttle curve as shown.

The adjustable range of output using the hovering throttle lever is approximately +/- 9%.

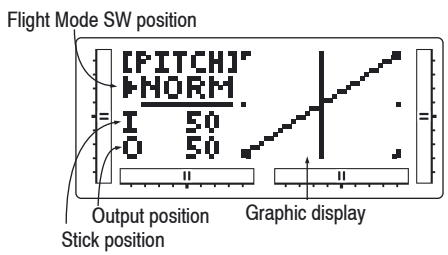
Note: The Hovering Throttle has no effect on flight mode switch position 1.

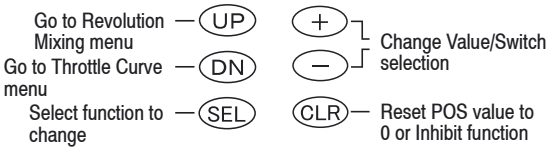


Pitch Curves

Adjustment of the pitch curve is very similar to the throttle curve adjustment described in the preceding section. A thorough understanding of the Throttle Curve Section will make pitch curve adjustment easier to understand. There are three independent types of pitch curves available: Normal, Stunt, and Hold. Each pitch curve contains five adjustable points: LOW 1, MID 3, and HIGH.

Note: The pitch curve for the Throttle Hold function can only be set if this system is activated.





Accessing the Pitch Curve Function

1. Place the transmitter power switch in the ON position.
2. Press the *Down* and *Select* keys simultaneously to enter the Function mode.
3. Press either the *Up* and *Down* key until **PITCH** appears in the top of the LCD.

Note: Use NORMAL for hover curses and STUNT for stunt curves. We will concentrate on the hovering curve during this example.

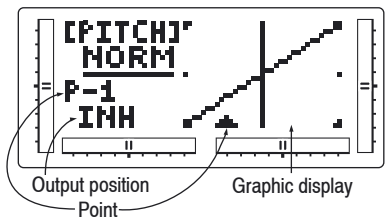
4. Press the Select key to select the point of the curve you want to change.
5. Press either the (+) or (-) key to change the value of the current curve point. The range of each point is 0-100% in 0.5% intervals.

Note: In each curve, the factory setting INH indicates Inhibited for points 1 and 3. These values are 25% and 75% respectively, if no value changes are made to any other points. If any of the other points have been changed while these points were inhibited, the inhibited points will change to plot a smooth curve. If you want to keep this from happening, press the *Select* key to display the positions 1 and 3, then press the (+) or (-) key to activate each point.

6. To set curves for STUNT mode, press the *Select* to highlight the NORM function, then press the (+) or (-) key to select the STUNT function, Repeat Steps 4 and 5 to complete the procedure.
7. To set the curves for the Throttle Hold mode “H“,

press the *Up* key once again until "H" is displayed, and repeat steps 4 and 5.

8. Access the **REVO MX** function by pressing the *Up* key.
9. Access the **THROTTLE CURVE** function by pressing the *Down* key.
10. Exit the **PITCH CURVE** function by pressing the *Down* and *Select* keys simultaneously.



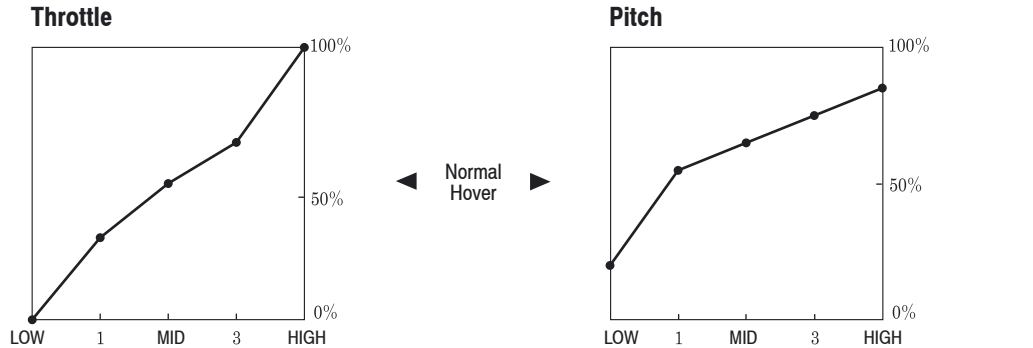
P-LOW : Full Slow position
P-1 : Stick 1/4 position
P-MID : Stick Center position
P-3 : Stick 3/4 position
P-HIGH : Full High position
* Point position is fixed

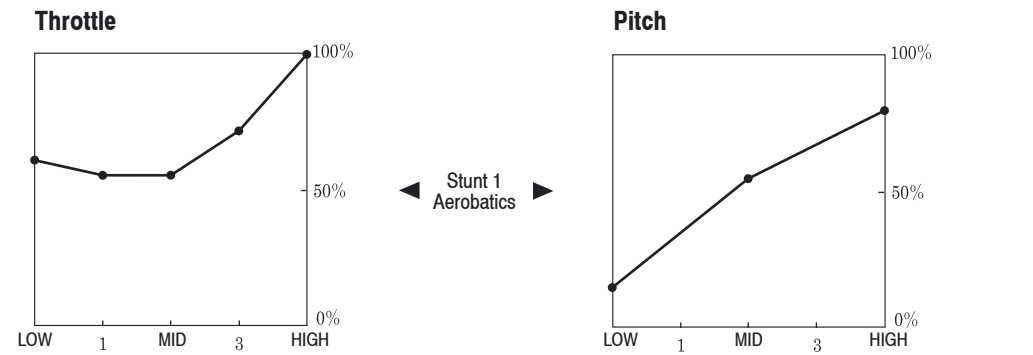
Hovering Pitch Lever

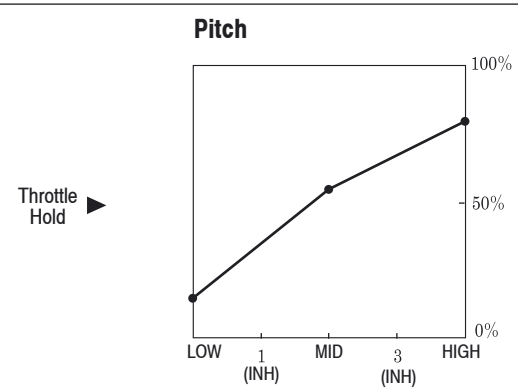
The Hovering Pitch lever operates in the same manner as the Hovering Throttle lever. It is only operable while the flight mode switch is in the NORMAL position, and its function is to shift the middle portion of the curve upward or downward.

Example of Throttle Curve and Pitch Curve Settings

An example of throttle curve and pitch curve settings for aerobatic specifications is shown below in the form of graphs. Details of the curves will differ depending on the helicopter specifications. In these examples, the throttle open-close stroke and autorotation pitch stroke are set 0 to 100 to ease your understanding of other curves.





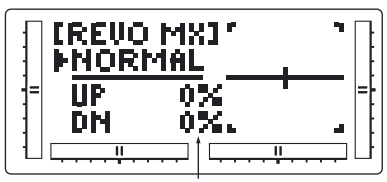


Function mode HELICOPTER

Revolution Mixing (Non-heading lock Gyros only), Programmable Mixing (1~2)

Revolution Mixing (Non-heading lock Gyros only)

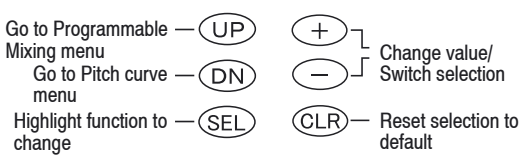
The Revolution Mixing function mixes tail rotor with the Throttle and Pitch Curve functions to counteract torque from the main rotor blades. When set up correctly, the helicopter should climb and descend without a tendency to yaw in either direction. Because torque reaction varies with different power settings, it is necessary to vary the tail rotor pitch at the same time. The mx-12 offers two separate revolution mixing programs, with independent up and down mixing for each - one for Flight mode position Normal and the other for Stunt. The up mixing adjusts the tail rotor compensation for the mid to high throttle setting and the down mixing adjusts the tail rotor compensation for the mid to low throttle setting.



Mixing Value (L125%~0~R125%)

Mixing Program
NORMAL
UP: Up side
DN: Down side

STUNT
UP: Up side
DN: Down side



Accessing the Revolution Mixing Function

1. Place the transmitter power switch in the ON position.
2. Press the *Down* and *Select* keys simultaneously to enter the Function Mode.
3. Press the *Up* or *Down* keys until **REVO MX** appears at the top of the LCD.
4. Pressing the *Select* key will highlight either the Up mix, Down mix, or the flight mode switch position. When the flight mode switch is in the displayed position and the throttle stick is in the displayed position, the flight mode will be underlined.
5. Press the (+) key to increase the right tail compensation or press the (-) key to increase the left compensation. Press the *Clear* to reset to 0%.
6. This setup procedure can be used for revolution mixing for either flight mode switch position Normal or Stunt. The Stunt position should be used for forward and/or inverted compensation.
7. Access the **PITCH CURVE** function by pressing the *Down* key.
8. Access the **MX1** function by pressing the *Up* key.
9. Exit the **REVO MX** function by pressing the *Down* and *Select* keys simultaneously.

Setting Up Revolution Mixing (non-heading lock, gyros only)

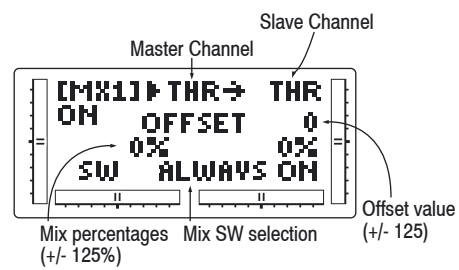
Set up the helicopter so that it will hover with the tail rotor trim entered. Establish the helicopter into a stable hover, then steadily increase the throttle to initiate a steady climb. The body of the helicopter will move in the opposite direction to the main rotor rotation. Increase the U, Up, setting until the helicopter climbs with no tendency to turn. At a safe altitude, close the throttle; the helicopter will same direction as the main rotor rotation. Increase the D, or Down, mix until the helicopter descends with no tendency to turn. Throttle stick movements should be slow, and the initial accerlation and deceleration swings should be ignored. The Accerlation Mixing function is provided to compensate for the main rotor accerlation (and decerlation) torque.

Programmable Mixing (1~2)

The mx-12 offers two programmable mixes to be used for any number of different purposes. This function allows mixing any one channel to any other channel. This mix can remain on at all times or be switched on and off in flight using a number or different switches.

Mix number 1 is of the standard variety, in that the digital trim for the master channel only affect the master channel, and not the slave channel. Mix number 2 is of the "Trim include" variety. This mix is used any time the mix requires the slave channels trim position to be varied when the master channels digital trim position is varied.

Each channel of this radio is identified by an abbreviated name. The chart below indicates the channel ant its corresponding abbreviation. The channel name appearing first is known as the "master channel" or the channel to which you want to mix. The second number is known as the "slave channel" or the channel that is beeing mixed into the master-channel. For example, AIL→RUD would indicate aileron-to-rudder mixing. Each time the aileron stick is moved, the aileron will deflect, and the rudder will automatically move in the direction and to the value input. Mixing is proportional, so small inputs of the master channel will produce small outputs of the slave channel. Each programmable mix has a mixing "offset". The purpose of the mixing offset is to redefine the neutral position of the slave channel.



Function mode HELICOPTER

Fail Safe

SW display	
ALWAYS ON:	Always Mixing On
RIGHT FWD:	Gear SW Forward side→On
RIGHT REA:	Gear SW Rear side→On
LEFT FWD:	FLAP SW Forward side→On
LEFT REA:	FLAP SW Rear side→On
AILE D/R:	AILE D/R SW Position 1→On
ELEV D/R:	ELEV D/R SW Position 1→On

Accessing the Programmable Mixing Function

1. Place the transmitter power switch in the ON position.
2. Press the *Down* and *Select* keys simultaneously to enter the Function mode.
3. Press either the *Up* or *Down* key until **MIX 1** appears in the LCD.

Selection the Master and Slave Mixing Channels

4. Press the (+) or (-) keys to select the master channel.
5. Press the *Select* key to move the cursor to the slave channel.
6. Press the (+) or (-) keys to select the slave channel.
7. Press the *Select* key once. The display will continue to show the current mixing channels at the top of the LCD, but now an arrow will indicate the current stick position (master) to be adjusted.

Setting the Mixing Values

8. While holding the master stick in the direction you want to mix, press the (+) or (-) keys to increase or decrease the mixing value for the slave channel. The value in the LCD will change to display the current mix value selected. Next, hold the master stick to the other side to adjust the mix for the other direction.

Setting the Mixing Switch Activation

9. Press the *Select* key until the SW is highlighted. The LCD with "ALWAYS ON" indicates the current switch that this mix currently selected to always be active (ON).

Mixing Operation and Switches

Each mixing program can be turned on and off by a lever or switch. The lever and switches that can be selected for program mixing are tabulated at the right with their abbreviations appearing on the display and their corresponding positions.

Setting the Mixing Channel Offset

1. Press the *Select* key until offset is highlighted. The display will show the current mixing channels at the top of the LCD, with the word "OFFSET" in the center of the LCD. The value to the right is the mixing Offset neutral point, currently 0.
2. A new value for the offset can be selected using the (+) or (-) keys. This is the new neutral point for the slave channel (Point that the mix is activated). Press the *Clear* key to reset the value back to 0.
3. Press the *Down* and *Select* keys simultaneously to exit the **Programmable Mix** function.

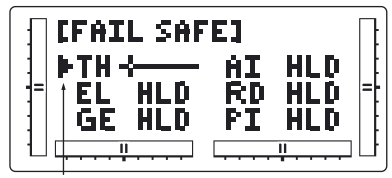
With a little practice, programmable mixing will become easier to understand. Mixing is only limited by your imagination.

Fail Safe

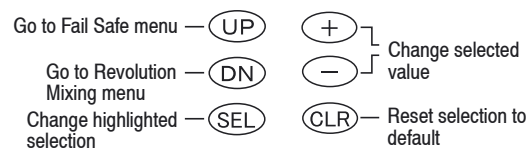
The Fail Safe Function is available only when you use the mx-12 transmitter in PCM modulations. This function is designed to help minimize damage to your aircraft during a loss of signal to the receiver. The servos either assume the Fail Safe presets or hold their last good signal position.

As noted earlier, if you are in the PPM modulation, the Fail Safe Function is not applicable. Therefore, the Fail Safe Function will not appear on your LCD screen menu while in the PPM mode. Refer to the Modulation Selection section for more information pertaining to the broadcast signal of you mx-12 transmitter.

Note: The throttle Fail Safe position is defaulted to the idle position for added safety.



Channel beeing programmed
TH : Throttle
AI : Aileron
EL : Elevator
RU : Rudder
GE : Gear
PI : Pitch



Accessing the Fail Safe Function

1. Place the transmitter power switch in the ON position.
2. Access the Function mode. To do so, press the *Down* and *Select* keys simultaneously. Press either the *Up* or *Down* key until **FAIL SAFE** appears in the upper portion of the LCD screen.
3. Use the *Select* key to highlight the servo function to set.
4. Use the (+) or (-) keys to toggle between servo hold or setting the servo position.
5. When using the servo setting position, move the corresponding control stick to the position where you want the servo if the radio enters into the fail safe mode. Press the *Clear* key to have the transmitter memorize the stick position.

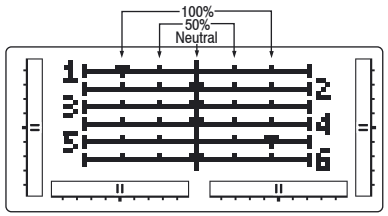
Function mode HELICOPTER

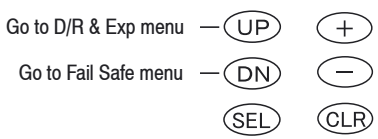
Servo Travel Screen

6. Repeat steps 4 and 5 until all six controls have been set.
7. Access the **SERVO TRAVEL** screen by pressing the *Up* key.
8. Access the **MIXING FUNCTIONS** function by pressing the *Up* key.
9. Exit the **FAIL SAFE** function by pressing the *Down* and *Select* keys simultaneously.

Servo Travel Screen

The Servo Travel Screen is used to verify the stick movements of the transmitter.
It can also be used to verify the mixing functions have been performed correctly without the need to turn on the aircraft.





Accessing the Servo Travel Screen

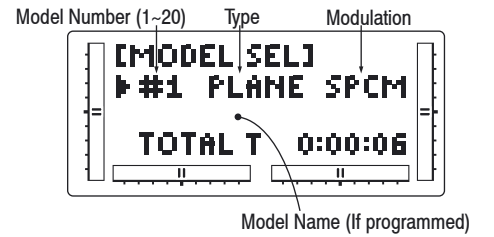
1. Place the transmitter power switch in the ON position.
2. Access the Function mode. To do so, press the *Down* and *Select* keys simultaneously. Press either the *Up* or *Down* key until the **SERVO TRAVEL** screen appears.
3. Move the sticks. The indicators correspond to the following:
   Indicator 1: Throttle
   Indicator 2: Aileron
   Indicator 3: Elevator
   Indicator 4: Rudder
   Indicator 5: Gear
   Indicator 6: Pitch
4. Access the **D/R & EXP** screen by pressing the *Up* key.
5. Access the **FAIL SAFE** function by pressing the *Up* key.
6. Exit the **SERVO TRAVEL** screen function by pressing the *Down* and *Select* keys simultaneously.

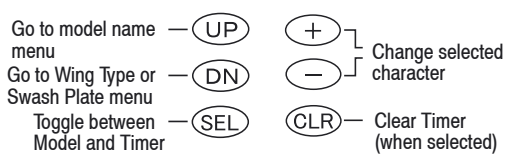
System Mode

Model Selection; Model Name Entry

Model Selection

The mx-12 system offers memory for ten completely separate models. Therefore, it is possible to have a mixture of helicopter and airplane setups retained in memory. It is also recommended that the Model Name Entry function be used in conjunction with each model setup. Another very useful function of the Model Selection function is the ability to set one aircraft up several different ways. This is helpful when multi-task performance is desired.



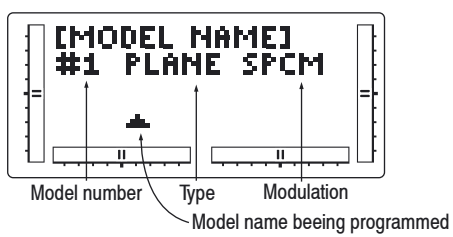


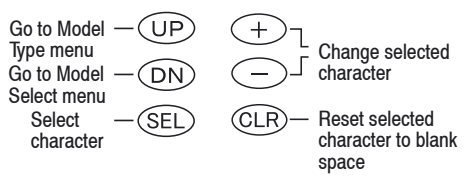
Accessing the Model Select Function

1. While pressing the Down and Select keys, switch the transmitter to the ON position to enter the Model select mode.
2. Model Select will be displayed on the upper left portion of the LCD. If not, press the *Up* or *Down* key until **MODEL SEL** is displayed.
3. Pressing the (+) or (-) key will select among each of the ten models available. Notice that as each model is selected, its name appears in the LCD.
4. Once the desired model is displayed on the left, pressing the *Down* and *Channel* keys simultaneously will exit the Model Selection function and establish the model displayed as the new current model.
5. Press the *Select* key to select the timer function to clear the Total Timer. Press the *Clear* key to clear the Total timer.
6. Press the *Down* key to access the **WING TYPE** function.
7. Press the *Up* key to access the **MODEL NAME** function.
8. Press the *Down* and *Select* keys simultaneously to exit the **MODEL SEL** function.

Model Name Entry

The mx-12 allows on 8-digit name to be input for each of the ten models available. The current model will be displayed in the Normal display.





Accessing the Model Select Function

1. While pressing the Down and Select keys, switch the transmitter to the ON position to enter the Model select mode.
2. Press the *Up* or *Down* key until **MODEL NAME** is displayed.
3. Press either the *Up* or *Down* key to select the first character for the model name.
4. Press the *Select* key to advance the character selection to the next character.
5. Repeat this procedure until all eight characters have been selected.
6. Press the *Down* key to access the **MODEL SEL** function.
7. Press the *Up* key to access the **MODEL TYPE** Selection function.
8. Press the Down and Select keys simultaneously to exit the MODEL NAME function.

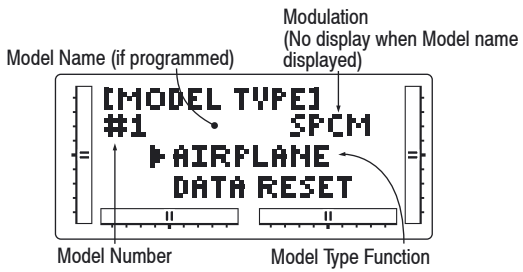
Selectable character:

System Mode

Model Type Selection; Model Copy Function

Model Type Selection

The mx-12 is capable of performing as a helicopter or airplane radio with full functions for each.

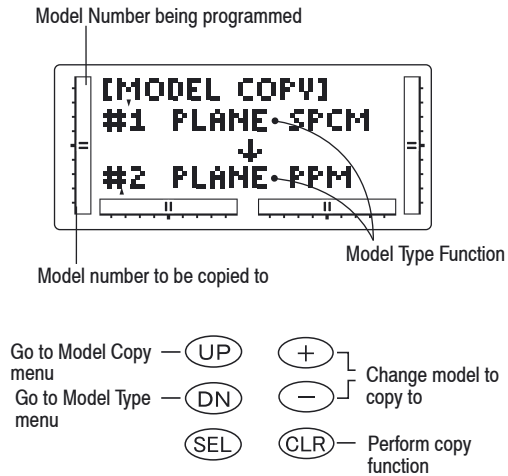


Accessing the Type Selection Function

1. While pressing the *Down* and *Select* keys, switch the transmitter to the ON position to enter the Model Setup mode.
2. Press either the *Up* or *Down* keys until **MODEL TYPE** is displayed in the left portion of the LCD.
3. Pressing either the (+) or (-) key will change the type of model.
4. Press the *Select* key to move the cursor to the Data Reset position.
5. Press the *Clear* key to reset the memory to the factory defaults.
6. Press the *Down* key to access the **MODEL NAME** function.
7. Press the *Up* key to access the **MODEL COPY** function.
8. Press the *Down* and *Select* keys simultaneously to exit the **MODEL TYPE** function.

Model Copy Function

The Copy Selection function enables you to copy all of the settings of the current model to another model within the same transmitter. This is very useful when setting up one aircraft several different ways or when trying an alternative setup of your current model.



Accessing the Model Copy Function

1. While pressing the *Down* and *Select* keys, move the transmitter`s power switch to the On position.
2. Press either the *Up* or *Down* key until **MODEL COPY** appears on the top left of the LCD.
3. The upper number that appears is the current model. This is important to note as only the current model will the copied. Press the (+) or (-) keys to select the desired program (lower number) to copy the current model to.
4. Next, press the *Clear* key. The current model will then be copied to the selected model.

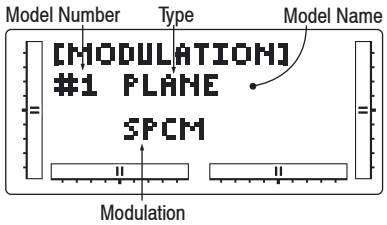
Note: Always make sure that the accepting model is either free of input or one which you no lon ger want to retain in your transmitter`s me mory. Once the copying process has been completed,the information of the accepting model is lost and the current model is input as the new data.

5. Press the *Up* key to access the **MODULATION** function.
6. Press the *Down* key to access the **MODEL TYPE** function.
7. Press the *Down* and *Select* keys simultaneously to exit the **MODEL COPY** function.

System Mode
Modulation Selection, Stick Mode

Modulation Selection

The Modulation Selection function enables your mx-12 to transmit to a variety of GRAUPNER receivers. You can select from either S-PCM (Pulse Code Modulation) or from PPM (Pulse Position Modulation [=FM]).



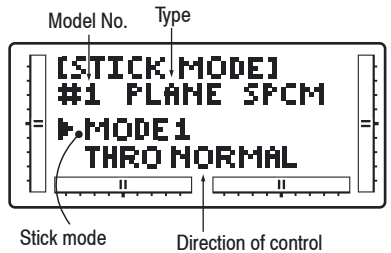
Accessing the Modulation Function

1. Move the power switch to the ON position while pressing the *Down* and *Select* key to access the System mode.
2. Press either the *Up* or *Down* key until MODULATION appears at the top of the LCD.
3. Press either (+) or (-) keys to change the modulation type.
4. Pressing the *Clear* key will also reset the modulation selection to the factory preset S-PCM.
5. Press the *Down* key to access the **MODEL COPY** function.
6. Press the *Up* key to access the **TRAINER** function.
7. To exit the **MODULATION** function, press the *Down* and *Select* keys simultaneously.

Note: In the normal display, the selected modulation type will appear in the upper right of the LCD.

Stick Mode

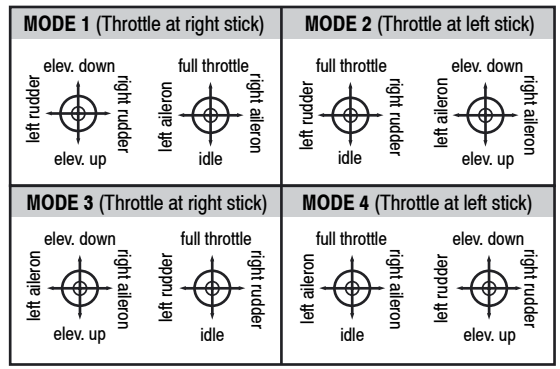
The four primary control functions are: aileron, elevator, rudder and throttle / airbrake for fixed-wing models; roll, pitch-axis, tail rotor and throttle / collective pitch for helicopters, and there are basically four different options for assigning them to the sticks. The choice of stick mode is a matter of the individual model flyer's preference.



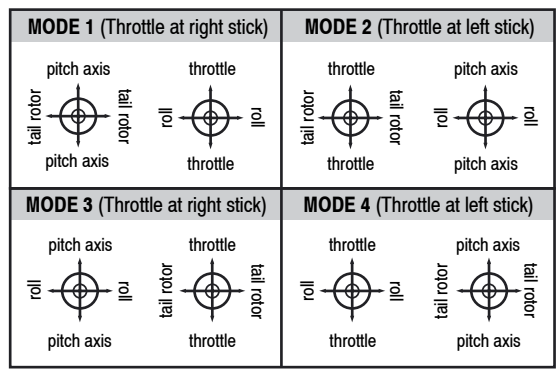
This is the procedure for changing stick mode:

1. Hold *DOWN* and *SELECT* pressed in simultaneously while you move the On/Off switch to ON; this takes you to System mode.
2. Press *UP* or *DOWN* until the screen displays STICK MODE at the top.
3. Press (+) or (-) to change the stick mode.
4. Pressing *Clear* resets the stick mode to the factory default (Mode 1).
5. Press the *DOWN* button to move to the MODULATION function.
6. Press *UP* to move on to the TRAINER function.
7. You can leave the STICK MODE function by pressing *DOWN* and *Select* simultaneously.

Fixed-wing stick mode:



Helicopter stick mode:



System Mode

Trainer Function

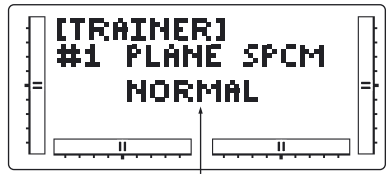
Trainer Function

The mx-12 offers a programmable trainer function with three trainer options:

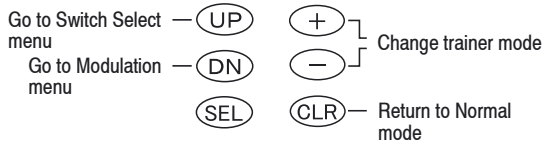
Normal mode: - In this mode the transmitter acts as a conventional buddy-box system. The transmitter can be used as a slave or as a master: however in this mode, the reversing switches and trims must be adjusted so the slave transmitter matches the master transmitter. In normal mode, when the trainer switch is activated, the student has control of all functions and switches.

Pilot Link: - When Pilot Link mode is used with the master transmitte, it allows the slave transmitter to be adjusted to factory defaults. The slave transmitter can simply be programmed in a model memory not being used and reset to factory defaults, thus preventing the need to synchronize the trims and reversing switches on the slave transmitter. Also when Pilot Link is used, the student only has control of the 4 basic channels (throttle, aileron, elevator, rudder) while the trainer (master) retains control of all other functions like gear, dual rate, programmed mixes, etc. This allows a pilot to have a test flight on a more complex airplane without having to remember complex switch positions.

Pilot Link + Slave: - This mode is used only wehen the mx-12 is being used as a slave transmitter and the other Master transmitter has a Pilot Link program active. By selecting Pilot Link + Slave the transmitter is automatically in the correct programming mode to work as a slave in conjunction with another Pilot Link equipped transmitter.



Trainer mode selected



Accessing the Trainer Function

1. Move the power switch to the ON position while pressing the *Down* and *Select* keys to access the System mode.
2. Press either the *Up* or *Down* key until **TRAINER** appears at the too of the LCD.
3. Press either the (+) or (-) keys to change the Trainer Type type.
4. Pressing the Clear key will return the trainer function to the “normal“ setting.
5. Press the Down key to access the **MODULATION** function.
6. Press the *Up* key to access the **SWITCH SEL** function.
7. To exit the **TRAINER** function, press the *Down* and *Select* keys simultaneously.

Note: The slave transmitter must always be in PPM modulation to operate.

Pilot Link + Slave automatically selects PPM modulation when activated.

When using other models of transmitters it will be necessary for the slave transmitter to be in PPM mode for the mx-12.

For Trainer operations you require one of the following accessory leads:

4179.1 Trainer lead for mx-12
For use with Graupner hand-held transmitters with DSC sockets

3290.8 Trainer lead for mx-12
For use with Graupner mc-... transmitters with trainer sockets

System Mode

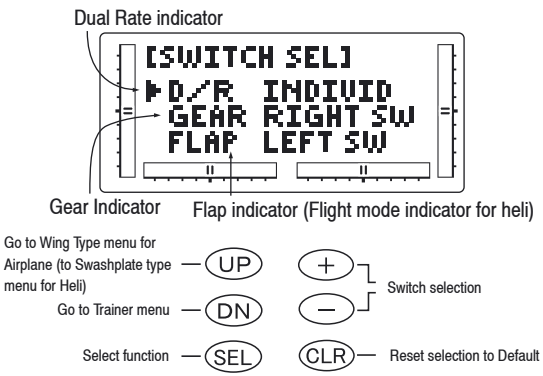
Switch Select

Switch Select

The mx-12 allows the several options to be programmed for the dual rate, gear and flap switches (flight mode switches for heli).

Aileron and Elevator dual rates can be programmed to be individually selected via its own switch (individ) or the aileron, elevator and rudder functions can be combined to operate from one of four switches.

The gear channel can be programmed to operate on one of four switched or rockers or it can be inhibited, helpful for some types of mixing. Plus the flap channel (flight mode channel for heli) can be programmed to operate from switches or levers.



Accessing the Modulation Function (For Airplane)

Dual Rates

D/R INDIVID (default)

In this mode the aileron and elevator rates are independently selected using the ELEV D/R and AILE D/R switches.

Note: In this mode the rudder D/R is always in the 0 position and is not selectable. This is the default setting.

COM AILE

In this mode the aileron, elevator and rudder dual rates are combined on the AILE D/R switch.

COM ELEV

In this mode the aileron, elevator and rudder dual rates are combined on the ELEV D/R switch.

COM R-SW

In this mode the aileron, elevator and rudder dual rates are combined on the upper right (flap) switch.

COM L-SW

In this mode the aileron, elevator and rudder dual rates are combined on the upper left (gear) switch.

Gear Channel

LEFT SW (default)

The gear channel operates from the left upper (gear) switch.

AILE D/R

The gear channel operates from the aileron dual rate switch

ROCKER

The gear channel operates from the right rocker switch and offers three positions.

INHIBIT

The gear channel is inhibited and is centered making it useful as a slave channel for mixing.

RIGHT SW

The gear channel operates from the right upper (flap) switch.

Flap Channel

RIGHT SW (default)

The flap channel operates from the right upper (flap) switch.

LEFT SW

The flap channel operates from the left upper (gear) switch.

ELEV D/R

The flap channel operates from the elevator dual rate switch.

FLAP LVR

The flap channel operates from the left flap lever and is proportional.

Accessing the Modulation Function (For Helicopter)

Dual Rates

D/R INDIVID (default)

In this mode the aileron and elevator rates are independently selected using the ELEV D/R and AILE D/R switches.

Note: In this mode the rudder D/R is always in the 0 position and is not selectable. This is the default setting.

COM AILE

In this mode the aileron, elevator and rudder dual rates are combined on the AILE D/R switch.

COM ELEV

In this mode the aileron, elevator and rudder dual rates are combined on the ELEV D/R switch.

COM R-SW

In this mode the aileron, elevator and rudder dual rates are combined on the upper right (flap) switch.

COM L-SW

In this mode the aileron, elevator and rudder dual rates are combined on the upper left (gear) switch.

Gear Channel

LEFT SW (default)

The gear channel operates from the left upper (gear) switch.

AILE D/R

The gear channel operates from the aileron dual rate switch.

System Mode

Wing Type Selection

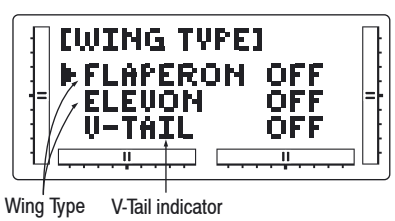
ELEV D/R
The gear channel operates from the elevator dual rate switch.
INHIBIT
The gear channel is inhibited and is centered making it useful as a slave channel for mixing.
RIGHT SW
The gear channel operates from the right upper (flap) switch.

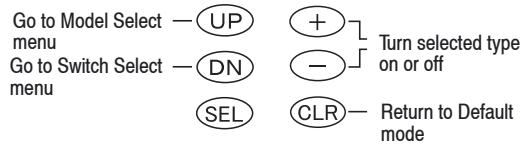
Flight Mode

LEFT SW (default)
The flight mode operates from the left upper (gear) switch.
AILE D/R
The flight mode operates from the aileron dual rate switch
ELEV D/R
The flight mode operates from the elevator dual rate switch.
RIGHT SW
The flight mode channel operates from the right upper switch.

Wing Type Selection

There are three different wing types to choose from; select the one that will best suit your RC aircraft. Flaperon, Elevon and V-Tail are available selections for Wing Type and will be covered in the following pages.





Definition of Wing Types

Normal

This is used with aircraft with one servo operating both ailerons. This mode is the default setting and is active when the Flapneron, Elevon and V-Tail modes are off.

Flaperon

This mode is used when two servos are used to operated the ailerons. Flaperons allow each aileron to be independently adjusted. In addition, they can be programmed to move in the same direction for use as flaps or spoilers.

Elevon

This mode is used for some types of delta wing aircraft where the control surfaces function as both ailerons and elevators.

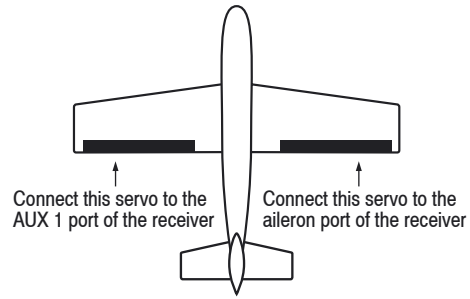
V-Tail

Used for V-tailed airplanes

Note: Some function will be unavailable when certain functions are active. With Flaperon active, Elevon will be unavailable. With Elevon active, both Flaperon and V-Tail will be unavailable. Finally, with V-Tail active, Elevon will be unavailable.

Flaperon Wing Type Selection

Flaperons allow you to use the existing ailerons as flaps. The ailerons can be raised or lowered in unisonas flaps, yet still remain fully operational as the ailerons of your RC airplane.



Accessing and Utilizing the Flaperon Wing Type Selection

1. While the *Down* and *Select* buttons are pressed, move the power switch to the ON position to access the System mode.
2. Press either the *Up* or *Down* keys until **WING TYPE** appears in the upper area of the LCD.
3. Press either the (+) or (-) key to turnon the Flaperon (FLPR) Wing Type Selection.

Note: For Flaperon, one servo must be used for each aileron control surface.

4. Plug the left wing aileron servo into the Auxiliary 1 (AUX1) port of your JR receiver. Connect the right aileron servo into the aileron port (AILE) of your receiver.
5. Check to make sure that the wing servos move in the proper direction. For a right turn, the right aileron should raise while the left aileron lowers simultaneously. For a left turn, the opposite is true; the left aileron should rise while the right aileron drops. If your servos are not moving in the direction just described, use the Servo Reversing function to reverse the the travel direction of the servo(s) that are moving improperly. Refer to the Servo Reversing section for information on how to reverse the travel

direction.

Note: Each servo‘s travel direction is adjusted individually through the Servo Reversing function.

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

Note: The applicable channel‘s left or right travel adjustment may be made individually by accessing the Travel Adjust function. Refer to the Travel Adjust section of this manual for more information. The fine adjustments of your aileron controls should be made in the Dual-Rate function. Refer to the Dual-Rate section for information on how to do so. You can also adjust the neutral point of your aileron servos individually through the use of the Sub-Trim function. Refer to the Sub-Trim section of this manual for more information.

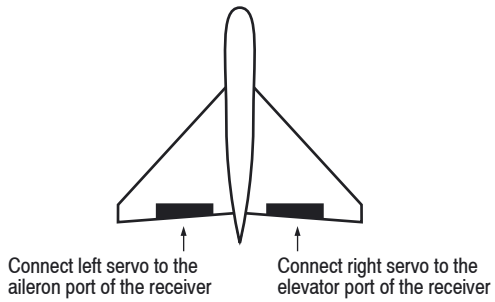
6. The flap lever located on the left face of the transmitter controls the aileron movements as flaps. To turn off flaps go to the **Flap System** function on page 39 and reduce the flap value to 0%.

Note: Differential is offered for the Flaperon function of your mx-12. For more information, please refer to the Differential section of this manual.

7. Press the *Down* key to access the **SWITCH SEL** function.
8. Press the *Up* key to access the **MODEL SEL** function.
9. Exit the **WING TYPE** function by pressing the *Down* and *Select* keys imultaneously.

Elevon Type Selection

Elevon Wing Mixing is available as an option with your mx-12. This style of aircraft also employs two wing servos. However, there is not an elevator present. Instead, an elevator stick input causes the two wing servos to function in conjunction with one another to change the pitch movement of the aircraft. Also, when an aileron control is given the two wing servos move in opposition to one another to function as ailerons.



Accessing and Ultilizing the Elevon Type Selection

1. While the *Down* and *Select* keys are pressed, move the power switch to the ON position to access the System mode.
2. Press either the *Up* or *Down* key until **WING TYPE** appears on the LCD.
3. Press the *Select* key to select the Elevon functions.
4. Press either the (+) or (-) key to turn on the Elevon Wing Type function.

Note: The Elevon function requires one servo for each elevon, i.e. a separate servo for each wing half.

5. Plug the left elevon servo to the aileron (AILE) of your GRAUPNER receiver. Connect the right elevon servo into the elevator (ELEV) port of your receiver.
6. Check to make sure the servos move in the proper direction. When an input is given from the elevator stick, they should move in unison to achieve the proper up/down elevator command. If your servos do not move as described above, use the Servo Reversing function to reverse the travel direction.

Note: Each servo‘s direction is adjusted individually through the Servo Reversing function. For more information, refer to the Servo Reversing section in this manual.

7. Once the servos direction has been set, adjust their travel direction, travel volume, dual-rates, sub-trim and aileron differential.

Note: The applicable channel‘s left or right, up or down travel adjustments can be made individually. Refer to the Travel Adjust section in this manual for more information.

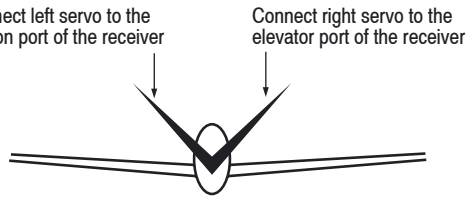
8. Relative to the note above, each servo‘s travel volume is automatically reduced to 75% of the operating range. This is to ensure that the servo does not operate beyond its capabilities. Failure to observe extreme caution when adjusting the value for the elevon servos may result in damage to the servos by over traveling.

Note: Fine adjustments of the elevons should be made in the Dual-Rate function. For more information, refer to the Dual-Rate section in this manual. You can also adjust the neutral point of your elevon servos individually using the Sub-Trim function as described in the Sub-Trim section of this manual. Differential is offered for the elevon function of your mx-12. For more information, refer to the Differential Aileron Mixing section of this manual.

9. Press the *Down* key to access the **SWITCH SEL** function.
10. Press the *Up* key to access the **MODEL SEL** function.
11. To exit the **WING TYPE** function, press the *Down* and *Select* keys simultaneously.

V-Tail Type Selection

V-tail mixing is available as an option with your mx-12. V-tail equipped aircraft require two servos.



Accessing and Utilizing the V-Tail Type Selection

1. While the *Down* and *Select* keys are pressed, move the power switch to the ON position to access the System mode.
2. Press either the *Up* or *Down* key until **WING TYPE** appears on the LCD.
3. Press the *Select* key to select the **V-Tail** function.
4. Press either the (+) or (-) key to turn on the **V-Tail** Wing Type function.
5. Connect the servo that controls the left tail control surface to the elevator (#3) channel in the receiver and the servo that controls the right control surface to the rudder (#4) channel in the receiver.

Note: Individual functions like reversing, travel adjust, dual rates, sub trims etc. are available for each servo independently.

6. Check to make sure the servos move in the proper direction. When an input is given from the elevator stick, they should move in unison to achieve the proper up/down elevator command. If your servos do not move in the correct direction, use the Servo Reversing function to reverse the travel direction.

Note: Each servo‘s direction is adjusted individually through the Servo Reversing function. For more information, refer to the Servo Reversing section in this manual.

7. Once the servos direction has been set, adjust their travel direction, travel adjust, dual rates, sub-trim.

Note: The applicable channel‘s left or right, up or down travel adjustments can be made individually. Refer to the Travel Adjust section in this manual for more information.

8. Relative to the note above, each servo‘s travel volume is automatically reduced to 50% of the operating range. This is to ensure that the servo does not operate beyond its capabilities. Failure to observe extreme caution when adjusting the value for the elevon servos may result in damage to the servos by over traveling.

Note: Fine adjustments of the V-Tail should be made in the Dual-Rate function. For more information, refer to the Dual-Rate section in this manual. You can also adjust the neutral point of your V-Tail servos individually using the Sub-Trim function as described in the Sub-Trim section of this manual.

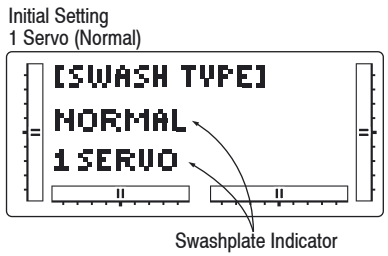
9. Press the *Down* key to access the **SWITCH SEL** function.
10. Press the *Up* key to access the **MODEL SEL** func tion.
11. To exit the **WING TYPE** function, press the *Down* and *Select* keys simultaneously.

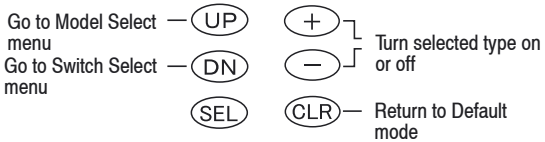
System Mode

Swashplate Type Selection

Swashplate Type Selection

The Swashplate Mixing function enables the mx-12 system to operate many different types of swashplate control systems, including 3 versions of CCPM.





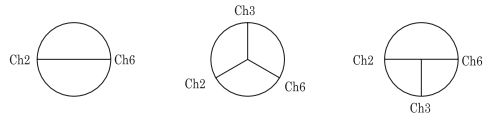
The Swashplate options are:

1 Servo: Non-CCPM, standard mixing type helicopter
2 Servo/180° CCPM
3 Servo/120° CCPM (GRAUPNER style, most popular)
4 Servo/90° CCPM

Definition of Swashplate Types

1. While pressing the *Down* and *Select* keys, switch the transmitter to the ON position to enter the system mode.
2. Press either the *Up* or *Down* key until **SWASH TYPE** is displayed in the upper center portion of the LCD.
3. Press the (+) or (-) keys to change the Swashplate type.
4. Pressing the *Clear* key will reset the Swashplate Type to the Normal position. 7. To access the AUX2 Switch function, press the *Down* key.
5. Press the *Up* key to access the **MODEL SELECT** function.
6. Press the *Down* key to access the **SWITCH SELECT** function.
7. Exit the **SWASH TYPE** function by pressing the *Down* and *Select* keys simultaneously.

CCPM Servo Variations



Approved operating frequencies, available crystals, frequency pennants

Thi
situation in your own country. It is prohibited to operate a radio control system on any frequency and channel other than those listed.

Frequency band	Approval	Channel No.	Transmitter frequency, MHz	**FMsss** crystals		**Precision** crystals		**DS** crystals		Approval by country (please check)										
				Transmitter, Order No.	Receiver, Order No.	Transmitter, Order No.	Receiver, Order No.	Dual-conversion crystals, Order No.		D	B	A	DK	FI	I	L	N	NL	S	CH
35 MHz-Band **Band A**	FE	61	35,010	**3864.61**	**3865.61**	**3264.61**	**3265.61**	**3270.61**												
	(for model aircraft only)	62	35,020	**.62**	**.62**	**.62**	**.62**	**.62**												
		63	35,030	**.63**	**.63**	**.63**	**.63**	**.63**												
		64	35,040	**.64**	**.64**	**.64**	**.64**	**.64**												
		65	35,050	**.65**	**.65**	**.65**	**.65**	**.65**												
		66	35,060	**.66**	**.66**	**.66**	**.66**	**.66**												
		67	35,070	**.67**	**.67**	**.67**	**.67**	**.67**												
		68	35,080	**.68**	**.68**	**.68**	**.68**	**.68**												
		69	35,090	**.69**	**.69**	**.69**	**.69**	**.69**												
		70	35,100	**.70**	**.70**	**.70**	**.70**	**.70**												
		71	35,110	**.71**	**.71**	**.71**	**.71**	**.71**												
		72	35,120	**.72**	**.72**	**.72**	**.72**	**.72**												
		73	35,130	**.73**	**.73**	**.73**	**.73**	**.73**												
		74	35,140	**.74**	**.74**	**.74**	**.74**	**.74**												
		75	35,150	**.75**	**.75**	**.75**	**.75**	**.75**												
		76	35,160	**.76**	**.76**	**.76**	**.76**	**.76**												
		77	35,170	**.77**	**.77**	**.77**	**.77**	**.77**												
		78	35,180	**.78**	**.78**	**.78**	**.78**	**.78**												
		79	35,190	**.79**	**.79**	**.79**	**.79**	**.79**												
		80	35,200	**.80**	**.80**	**.80**	**.80**	**.80**												
Band B Only for equipment approved for use on Band B. Existing units can be re-tuned by our Service Department	(for model aircraft only)	182	35,820	**.182**	**.182**	**.182**	**.182**	**.182**												
		183	35,830	**.183**	**.183**	**.183**	**.183**	**.183**												
		184	35,840	**.184**	**.184**	**.184**	**.184**	**.184**												
		185	35,850	**.185**	**.185**	**.185**	**.185**	**.185**												
		186	35,860	**.186**	**.186**	**.186**	**.186**	**.186**												
		197	35,870	**.187**	**.187**	**.187**	**.187**	**.187**												
		188	35,880	**.188**	**.188**	**.188**	**.188**	**.188**												
		189	35,890	**.189**	**.189**	**.189**	**.189**	**.189**												
		190	35,900	**.190**	**.190**	**.190**	**.190**	**.190**												
		191	35,910	**.191**	**.191**	**.191**	**.191**	**.191**												
40 MHz-Band	MF	50	40,665	**4064.50**	**4065.50**			**3240.50**												
		51	40,675	**.51**	**.51**			**.51**												
		52	40,685	**.52**	**.52**			**.52**												
		53	40,695	**.53**	**.53**			**.53**												
	(for model boats and cars only)	54	40,715	**.54**	**.54**			**54**												
		55	40,725	**.55**	**.55**			**.55**												
		56	40,735	**.56**	**.56**			**.56**												
		57	40,765	**.57**	**.57**			**.57**												
		58	40,775	**.58**	**.58**			**.58**												
		59	40,785	**.59**	**.59**			**.59**												
		81	40,815	**.81**	**.81**			**.81**												
		82	40,825	**.82**	**.82**			**.82**												
		83	40,835	**.83**	**.83**			**.83**												
		84	40,865	**.84**	**.84**			**.84**												
		85	40,875	**.85**	**.85**			**.85**												
		86	40,885	**.86**	**.86**			**.86**												
		87	40,915	**.87**	**.87**			**.87**												
		88	40,925	**.88**	**.88**			**.88**												
		89	40,935	**.89**	**.89**			**.89**												
		90	40,965	**.90**	**.90**			**.90**												
		91	40,975	**.91**	**.91**			**.91**												
		92	40,985	**.92**	**.92**			**.92**												

Approval certificate

CETECOM ICT Services GmbH

EC Identification number 0682

authorized by the German Government

to act as Notified Body in accordance with the R&TTE Directive 1999/5/EC of 09. March 1999.

CERTIFICATE
EXPERT OPINION

Registration-No.: **E814320S-EO**

Certificate Holder: **Graupner GmbH & Co. KG**
Henriettenstraße 94-96

D-73230 Kirchheim/Teck

Product Designation: **mx-12**

Product Description: **Short Range Devices**

Product Manufacturer: **Graupner GmbH & Co. KG**
Henriettenstraße 94-96

D-73230 Kirchheim/Teck

Essential requirements	Specifications / Standards	Submitted documents	Result
Radio spectrum (R&TTE, Article 3.2)	EN 300 220-1 V1.3.1 (2000-09) EN 300 220-3 V1.1.1 (2000-09)	Test Report	conform

Marking: **The product shall be marked with CE, our notified body number and the Class II identifier (Alert sign) as shown right hand.** CE 0682 !

The scope of this evaluation relates to the submitted documents only.
The certificate is only valid in conjunction with the following number of annexes.

Number of annexes: 1

Saarbrücken, 28.04.2005
Place, Date of Issue

Signed by Ernst Hussinger
Notified Body

CETECOM ICT Services GmbH, Untertürkheimer Straße 6-10, D-66117 Saarbrücken, Germany
http://www.cetecom-ict.de

Annex 1 of the Certificate „EXPERT OPINION"
Registration no.: E814320S -EO Date: 28.04.2005
Page 1 of 1

Product Characteristics:

Transmitter for remote controlled model

Frequency Range	:	34.995 – 35.225 MHz 35.820 – 35.910 MHz 40.665 – 40.985 MHz 41.000 – 41.200 MHz
RF-Output Power (ERP)	:	≤ 100 mW
Type of Modulation	:	FM (PCM / PPM)
Number of RF-Channels	:	1
Channel Separation	:	10 kHz
Operation Mode	:	simplex
Duty Cycle	:	up to 100%
Antenna	:	rod telescopic antenna
Temperature Range	:	-15 °C to +55°C

Conformity Details:

Evaluated testreports	
Requirement	**Standard, test report number, date & laboratory**
Radio spectrum	**EN 300 220-1 V1.3.1 (2000-09)** **EN 300 220-3 V1.1.1 (2000-09)** **Test Report 2-3953-01-01/05 issued 2005-04-26 by CETECOM ICT**

Miscellaneous:

- TCF according to the application

******

Conformity certificate

CETECOM ICT Services GmbH

CETECOM™

CERTIFICATE OF CONFORMITY

Registration-No.: **E814320S-CC** Number of annexes: ---

Certificate Holder: **Graupner GmbH & Co. KG**
Henriettenstraße 94-96

D-73230 Kirchheim/Teck

Product Designation: **mx-12**

Product Description: **Short Range Devices**
(transmitter for remote controlled model)

Product Manufacturer: **Graupner GmbH & Co. KG**
Henriettenstraße 94-96

D-73230 Kirchheim/Teck

Specifications and test reports:

Specification	Test report no. & date	Name of test laboratory	Notes
EN 300 220-1 V1.3.1 (2000-09) EN 300 220-3 V1.1.1 (2000-09)	2-3953-01-01/05 dated 2005-04-26	CETECOM ICT	conform

Statement **This equipment fulfils the requirements or parts thereof in the above mentioned specifications.**

CETECOM ICT Services is authorized to act as Notified Body in accordance with the R&TTE Directive 1999/5/EC of 09. March 1999

Saarbrücken, 28.04.2005
Place, Date of Issue

Signed by Ernst Hussinger
Notified Body

CETECOM ICT Services GmbH, Untertürkheimer Straße 6-10, D-66117 Saarbrücken, Germany

EU conformity declaration

Konformitätserklärung gemäß dem Gesetz über Funkanlagen und Telekomunikationsendeinrichtungen (FTEG) und der Richtlinie 1999/5/EG (R&TTE)
Declaration of Conformity in accordance with the Radio and Telecomunikations Terminal Equipment Act (FTEG) and Directive 1999/5/EG (R&TTE)

Graupner GmbH & Co. KG
Henriettenstraße 94-96
D-73230 Kirchheim/Teck

erklärt, dass das Produkt: **mx-12**
declares that the product

Verwendungszweck: **Funkanlage zur Fernsteuerung von Modellen**
Intended purpose **Radio equipment for remote controlling of models**

Geräteklasse: **2**
Equipment class

bei bestimmungsgemäßer Verwendung den grundlegenden Anforderungen des § 3 und den übrigen einschlägigen Bestimmungen des FTEG (Artikel 3 der R&TTE) entspricht.
complies with the essential requirements of § 3 and the other relevant provisions of the FTEG (Article 3 of the R&TTE Directive), when used for its intended purpose

Angewendete harmonisierte Normen:
Harmonised standards applied

EN 60950 Gesundheit und Sicherheit gemäß § 3 (1) 1. (Artikel 3 (1) a))
Health and safety requirements pursuant to § 3 (1) 1. (Article 3 (1) a))

EN 301 489-1/-3 Schutzanforderungen in Bezug auf die elektromagnetische Verträglichkeit § 3 (1) 2, Artikel 3 (1) b))
Protection requirement concernig electromagnetic compatibility § 3 (1) 2, Artikel 3 (1) b))

EN 300 220-1/-3 Maßnahmen zur effizienten Nutzung des Frequenzspektrums § 3 (2) (Artikel 3 (2))
Measures for the efficient use of the radio frequency spectrum § 3 (2) (Article 3 (2))

CE 0682 !

Kirchheim, 04. Mai 2005

Hans Graupner, Geschäftsführer
Hans Graupner, Managing Director

Graupner GmbH & Co. KG Henriettenstraße 94-96 D-73230 Kirchheim/Teck Germany
Tel: 07021/722-0 Fax: 07021/722-188 EMail: info@graupner.de

Graupner

Garantieurkunde

Wir gewähren auf dieses Erzeugnis eine Garantie von 24 Monaten
This product is warrantied for 24 months
Sur ce produit nous accordons une garantie de 24 mois

Servicestellen / Service / Service après-vente

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D-73220 Kirchheim

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Montag - Freitag
930 -1130 und 1300 -1500 Uhr

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☎ (+31)10 59 13 59 4

Die Fa. Graupner GmbH & Co. KG, Henriettenstraße 94-96, 73230 Kirchheim/Teck gewährt ab dem Kaufdatum auf dieses Produkt eine Garantie von 24 Monaten. Die Garantie gilt nur für die bereits beim Kauf des Produktes vorhandenen Material- oder Funktionsmängel. Schäden, die auf Abnützung, Überlastung, falsches Zubehör oder unsachgemäße Behandlung zurückzuführen sind, sind von der Garantie ausgeschlossen. Die gesetzlichen Rechte und Gewährleistunsansprüche des Verbrauchers werden durch diese Garantie nicht berührt. Bitte überprüfen Sie vor einer Reklamation oder Rücksendung das Produkt genau auf Mängel, da wir Ihnen bei Mängelfreiheit die entstandenen Unkosten in Rechnung stellen müssen.

Graupner GmbH & Co. KG, Henriettenstraße 94-96. 73230 Kirchheim/Teck, Germany guarantees this product for a period of 24 months from date of purchase. The guarantee applies only to such material or operational defects witch are present at the time of purchase of the product. Damage due to wear, overloading, incompetent handling or the use of incorrect accessories is not covered by the guarantee. The user´s legal rights and claims under garantee are not affected by this guarantee. Please check the product carefully for defects before you are make a claim or send the item to us, since we are obliged to make a charge for our cost if the product is found to be free of faults.

La société Graupner GmbH & Co. KG, Henriettenstraße 94-96, 73230 Kirchheim/Teck, Allemagne, accorde sur ce produit une garantie de 24 mois à partir de la date d´achat. La garantie prend effet uniquement sur les vices de fonction-nement et de matériel du produit acheté. Les dommages dûs à de l´usure, à de la surcharge, à de mauvais accessoires ou à d´une application inadaptée, sont exclus de la garantie.

Cette garantie ne remet pas en cause les droits et prétentions légaux du consommateur. Avant toute réclamation et tout retour du prouit, veuillez s.v.p. cotrôler et noter exactement les défauts ou vices.

Garantie-Urkunde

Warranty certificate / Certificate de garantie

mx-12

☐	4722	mx-12	35-MHz
☐	4722.B	mx-12	35-MHz-B
☐	4723	mx-12	40-MHz
☐	4723.41	mx-12	41-MHz

Übergabedatum:
Date of purchase/delivery:
Date de remise:

Name des Käufers:
Owner´s name:
Nom de l`achateur:

Straße, Wohnort:
Complete adress:
Domicie et rue:

Firmenstempel und Unterschrift
des Einzelhändlers:
Stamp and signature of dealer:
Cachet de la firme et signature
du detailant :

Graupner | JR

REMOTE CONTROL

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GERMANY
http://www.graupner.de

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