

TOWER HOBBIES®

SYSTEM 3000™

4FM 4-CHANNEL FM RADIO CONTROL SYSTEM INSTRUCTION MANUAL FOR R/C AIRCRAFT USE

Congratulations on your purchase—and thank you for choosing our Tower Hobbies® System 3000™ 4FM radio! I'm sure you'll enjoy many hours of trouble-free flying with it, because it includes all the features we knew you'd want in a solid, sensible flight system.

The 4FM offers four-channel control, the magic number for many sport and competition planes. As an FM (Frequency Modulated) narrow-band system, it's far less vulnerable to interference than AM radios. The narrow-band transmitter and dual-conversion receiver enhance strong control by filtering and boosting the signal. Put them together, and you have a radio that can provide smooth, glitch-free control even in today's "noisiest" radio environments.

Those are big pluses, but we went the extra mile to make the 4FM the most versatile and easy-to-use radio we've ever offered. The case is designed for a firm, comfortable "hand feel." Pick it up, and levers, sticks and switches almost seem to move to meet your hand. That includes the switch for the built-in trainer system—an extra that can help you learn from other flyers, or help others "learn the ropes."

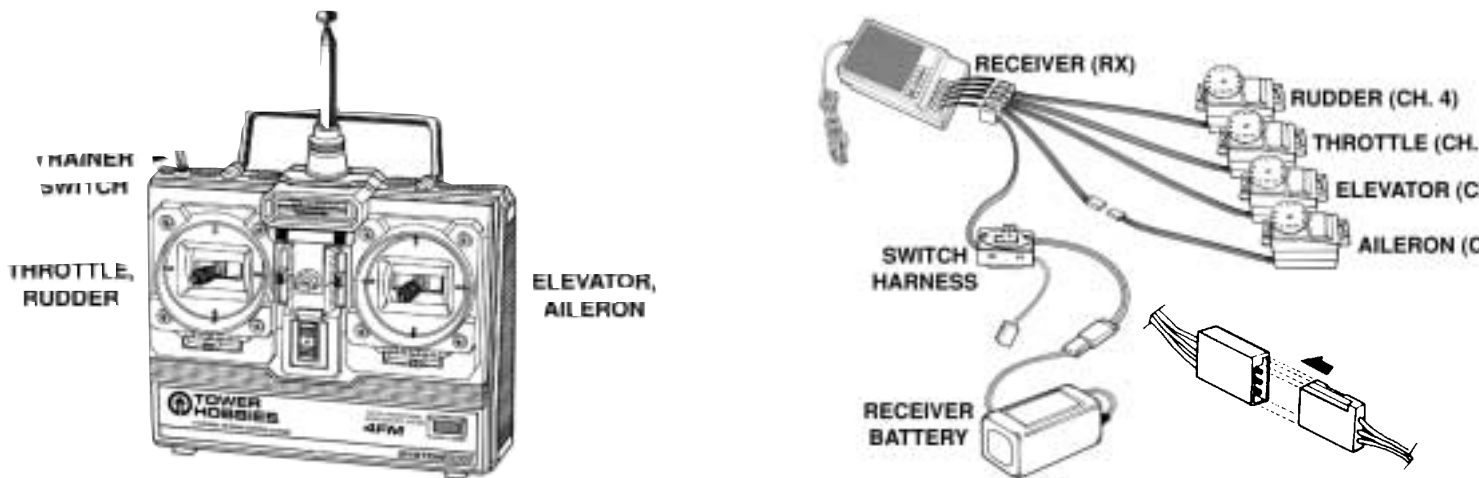
We also included rechargeable, NiCd batteries and a charger, a convenience that saves you time and money. And we made sure that the 4FM was compatible with all Tower Hobbies System 2000™ (J-connector) servos. That's a plus that offers affordability in servos ranging from minis to 1/4 scale.

Solid value, ease of use, versatility—the 4FM offers it all, plus a 1-year limited warranty, the ultimate in protection for your radio investment. Again, congratulations on your purchase—and happy flying!

Sincerely yours,

Bruce R. Holecek
Founder and Chief Executive Officer,
Tower Hobbies

QUICK REFERENCE GUIDE



NOTE: This Quick Reference Guide is a condensed version of all information given in this manual. We strongly recommend you first read this entire manual before operating your System 3000 R/C system.

1. Charge the transmitter and receiver batteries for 15 hours with the included charger.
2. Connect servos, 4-cell battery pack and switch harness as shown above.
3. Turn on the transmitter, then turn on the receiver switch harness.
4. Center all four transmitter trim levers. Make sure all servos operate according to transmitter stick movements.
5. Turn off the system, receiver first, then transmitter.
6. Wrap the receiver and receiver battery in 1/4" - 1/2" foam rubber (Tower part no. HCAQ1000 and HCAQ1050).
7. Install the entire radio system into your model as shown in the model's instruction manual (see above for proper channel usage).
8. If you need to reverse the direction in which a servo rotates, locate the servo reversing switch for that particular channel on the bottom of the transmitter and slide it to the "REV" position.
9. Range test the radio system prior to flight. With the transmitter antenna collapsed, you should be able to smoothly control movement of all control surfaces on your model from at least 100 ft. on the ground. If not, refer to the Troubleshooting Guide on page 7 for directions.

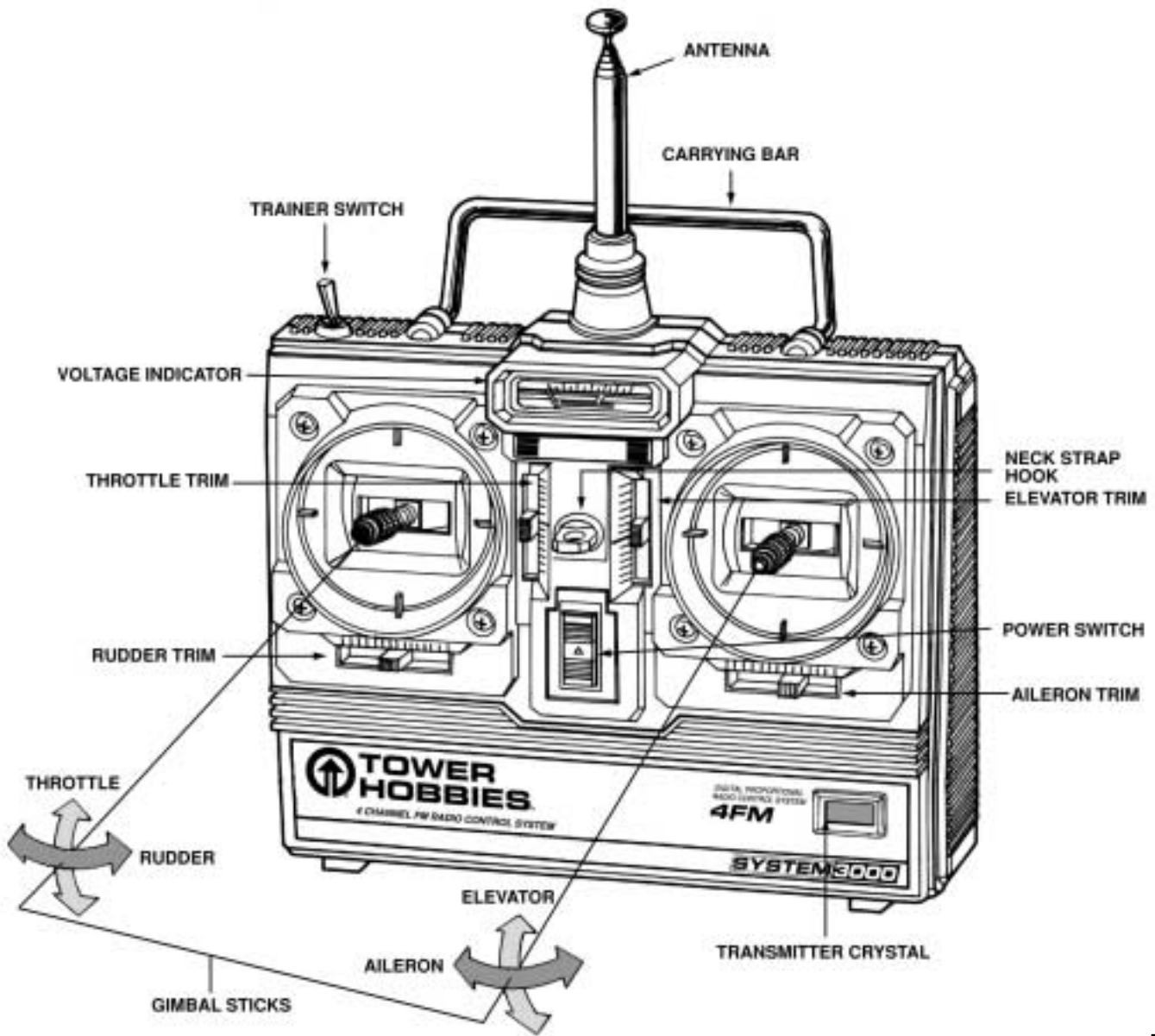


FIGURE 1

The 4FM transmitter (Tx) is designed for **mode II** operation. Mode II is most commonly used throughout the U.S. and incorporates the control of aileron and elevator on the right stick, throttle and rudder on the left stick (see figure 1). During normal conditions, the **range**, or safe operating distance from the Tx to the Rx is "line of sight". This means the 4FM should maintain complete control any time you can see your model. The 4FM operates on the 72MHz frequency band. There are 50 different channels in the 72MHz band ranging from 72.010MHz (Ch11) through 72.990MHz (Ch60). For safety reasons, you must always be aware of what channel you are using so that no two radios in the same area are **EVER** operating on the same frequency simultaneously.

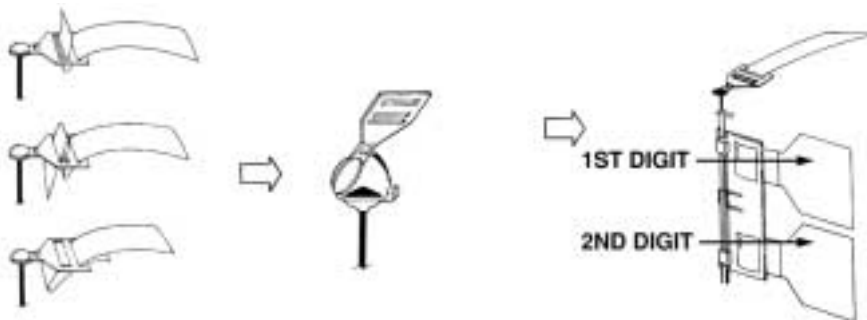
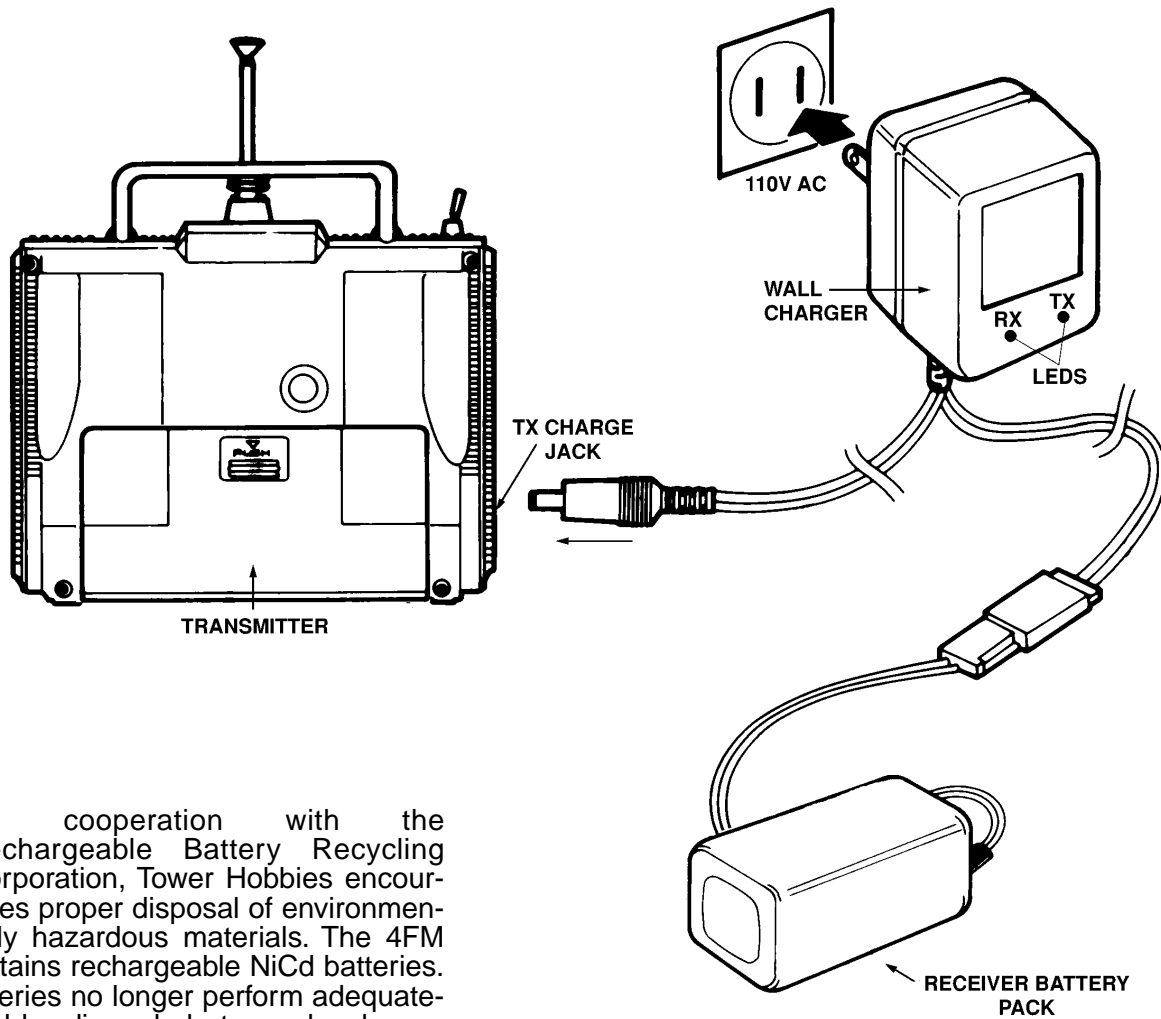


FIGURE 2

Use the **frequency flags** that are supplied with your R/C system so that other modelers at the flying field can identify your channel number. Attach the flags to the Tx antenna as shown in figure 2.

The rechargeable batteries inside the transmitter and the receiver pack must be fully charged prior to use. Plug the charger into a 110V AC wall outlet. Next, connect the charger's output leads to the Rx battery pack and Tx charge jack. The respective charger LEDs will illuminate as you connect the charger to the batteries. Charge each battery for 15 hours. The batteries may become warm as they charge. This is normal and a good indication that the batteries are becoming fully charged. **NOTE:** The Tx and Rx batteries should be charged the night before each use.



In cooperation with the Rechargeable Battery Recycling Corporation, Tower Hobbies encourages proper disposal of environmentally hazardous materials. The 4FM contains rechargeable NiCd batteries.

Once the batteries no longer perform adequately, they should be discarded at your local recycling center. Or, call 1-800-8-BATTERY for information. It may be illegal to dispose of NiCd batteries with common waste in your state.

FIGURE 3

If the batteries have not been used for several months, you may need to **cycle** them prior to use. Cycling is the process of fully charging, then discharging, rechargeable batteries to help maximize their charge capacity and run time. To cycle a battery, charge it for 15 hours, then discharge it by turning on the transmitter. The Tx's voltage indicator should not drop into the red zone (with the antenna extended) for 90 to 120 minutes. If it does, cycle the batteries again. If the batteries still cause the voltage indicator to drop in less than 90 minutes after repeated cycles, battery replacement is recommended. The old batteries should be disposed of at a recycling center.

SERVO

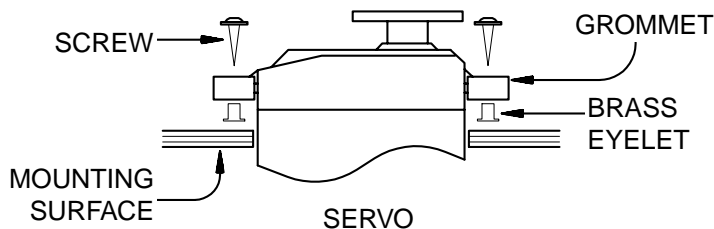


FIGURE 4

Because there are a variety of specific applications for servos in R/C modeling, different servos are designed for different applications. Tower Hobbies offers a large line-up of servos which you can choose from (see page 8). Mount all servos into the model as shown in your model's manual. Use the rubber grommets, screws and brass eyelets supplied when mounting your servos (see figure 4). Do **NOT** over-tighten the mounting screws. The servos should be able to move slightly to compensate for engine vibration. For each servo, use a servo horn long enough to accommodate the entire range of movement for that particular control.

RECEIVER, SWITCH HARNESS AND RECEIVER BATTERY

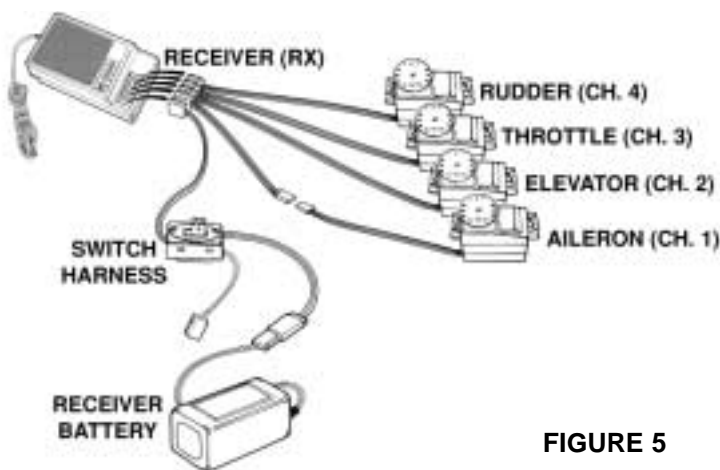


FIGURE 5

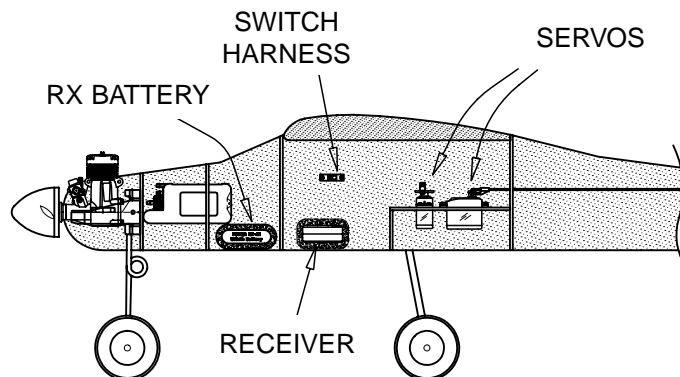


FIGURE 6

After the receiver and servos are mounted in your model, connect the servos and switch harness to the receiver as shown in figure 5. Turn on the Tx, then the Rx switch harness. Make sure all servos operate according to the movement of the Tx sticks. Center all trim levers, turn off the Rx switch harness, then the transmitter, and be careful not to move the servo arms from their centered position during installation. The servo connectors are keyed to prevent improper connection, but do pay close attention when connecting them to the receiver. The black wire goes toward the outside edge of the receiver case.

Mount the switch harness to the side of the fuselage away from the engine exhaust (refer to your model's instruction manual). Connect the red plug to the receptacle on the Rx marked "B" for battery. Connect the 4.8V Rx battery to the female plug on the switch harness. Wrap the receiver and battery in $\frac{1}{4}$ "- $\frac{1}{2}$ " foam rubber (HCAQ1000, HCAQ1050) to reduce vibration. Route the receiver antenna according to the model's instructions. Do **NOT** cut or coil the antenna or you may lose adequate operational range. Mount the receiver and battery in the model as shown in figure 6. **NOTE:** You may mount the battery fore or aft of the location shown to better balance the aircraft.

Range test the radio system prior to flight. With the Tx antenna collapsed, you should be able to smoothly control movement of all control surfaces on your model from at least 100 ft. on the ground. If not, refer to the 4FM's Troubleshooting Guide on page 7 before proceeding.

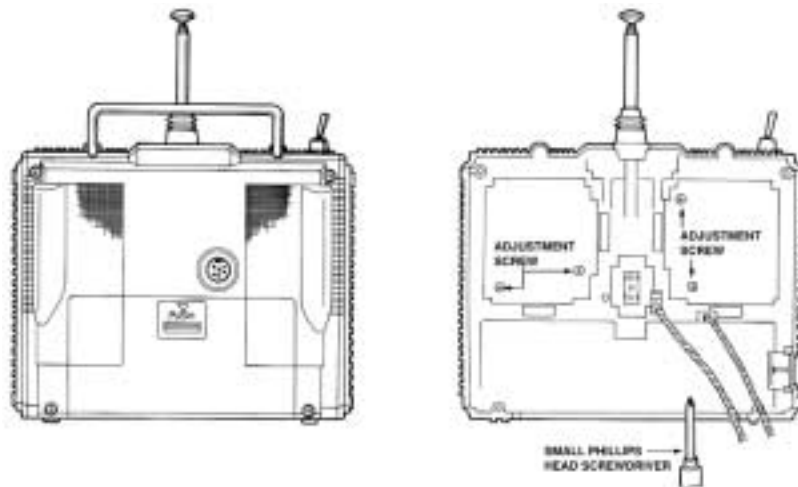


FIGURE 7

The **stick tension** can be adjusted from inside the transmitter. This allows you to customize the feel of the sticks to your hands. **NOTE:** Be cautious when removing and replacing the transmitter backplate. Do not pinch or pull wiring harnesses or drop objects onto the PC board. Electrical short circuits may permanently damage the radio and void your warranty. Remove the screws from each corner on the back of the transmitter (four total). The tension adjustment screws are shown in figure 7.

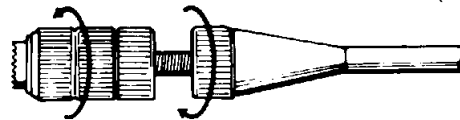


FIGURE 8

The **stick lengths** can be adjusted also (see figure 8). Turn the stick head (a) counter-clockwise and stick head (b) clockwise to unlock. Adjust the length to your preference and lock in reverse order.



TRAINER FUNCTIONS

CAUTION: Only train with an experienced pilot controlling the trainer transmitter!

The Tower Hobbies 4FM training cord system is Futaba® compatible (you cannot use an AM or PCM transmitter when training with an FM radio, and vice-versa). Before training with the airplane, follow these important pre-flight checks:

1. Connect the Tower Hobbies trainer cord (TOWM6080) to the trainer cord jack on the back of both transmitters (see figure 7).
2. Turn on the teacher's Tx and the Rx switch harness in the model. Do NOT turn on the student's transmitter (it will be powered by the teacher's radio).
3. Press and hold the trainer switch on the teacher's Tx. Control of the aircraft is now passed on to the student's Tx.
4. Set the trims and reversing switches on the student's Tx to match the teacher's Tx.
5. Release the trainer switch to allow the teacher to regain complete control of the model from the student.
6. You are ready to begin training.

To make your R/C modeling experience more enjoyable, we recommend that you get experienced, knowledgeable help during your first flights. You'll learn faster and avoid risking your model before you're truly ready to solo.

You can contact the national Academy of Model Aeronautics (AMA), which has more than 2,300 chartered clubs across the country. Most of the clubs provide instructor training programs and insured newcomer training. Contact the AMA at:

Academy of Model Aeronautics
5151 East Memorial Drive
Muncie, IN 47302-9252

Tel: (800) 435-9262 Fax: (317) 741-0057

World Wide Web Address: <http://www.modelaircraft.org/>



Read and abide by the following Academy of Model Aeronautics Official Safety Code:

Model Flying **MUST** be in accordance with this Code in order for AMA Liability Protection to apply.

GENERAL

1. I will not fly my model aircraft in sanctioned events, air shows, or model flying demonstrations until it has been proven to be airworthy by having been previously, successfully flight tested.
2. I will not fly my model higher than approximately 400 feet within 3 miles of an airport without notifying the airport operator. I will give right-of-way and avoid flying in the proximity of full-scale aircraft. Where necessary, an observer shall be utilized to supervise flying to avoid having models fly in the proximity of full-scale aircraft.
3. Where established, I will abide by the safety rules for the flying site I use and I will not willfully and deliberately fly my models in a careless, reckless and /or dangerous manner.
4. At all flying sites a straight or curved line(s) must be established in front of which all flying takes place with the other side for spectators. Only those persons essential to the flight operations are to be permitted on the flying side of the line; all others must be on the spectator side. Flying over the spectator side of the line is prohibited, unless beyond the control of the pilot(s). In any case, the maximum permissible takeoff weight of the models is 55 pounds.
5. At air shows or model flying demonstrations a single straight line must be established, one side of which is for flying, with the other side for spectators. Only those persons accredited by the contest director or other appropriate official as necessary for the flight operations or as having duties or functions relating to the conduct of the show or demonstration are to be permitted on the flying side of the line. The only exceptions which may be permitted to the single straight line requirements, under special circumstances involving consideration of site conditions and model size, weight, speed, and power, must be jointly approved by the AMA President and the Executive Director.
6. Under all circumstances, if my model weighs over 20 pounds, I will fly it in accordance with paragraph 5 of this section of the AMA Safety Code.
7. I will not fly my model unless it is identified with my name and address or AMA number, on or in the model.
NOTE: This does not apply to models flown indoors.
8. I will not operate models with metal-bladed propellers or with gaseous boosts, in which gases other than air enter their internal combustion engine(s); nor will I operate models with extremely hazardous fuels such as those containing tetranitromethane or hydrazine.
9. I will not operate models with pyrotechnics (any device that explodes, burns, or propels a projectile of any kind) including, but not limited to, rockets, explosive bombs dropped from models, smoke bombs, all explosive gases (such as hydrogen-filled balloons), ground mounted devices launching a projectile. The only exceptions permitted are rockets flown in accordance with the National Model Rocketry Safety Code or those permanently attached (as per JATO use); also those items authorized for Air Show Team use as defined by AST Advisory Committee (document available from AMA HQ). In any case, models using rocket motors as a primary means of propulsion are limited to a maximum weight of 3.3 pounds and a G series motor. **NOTE:** A model aircraft is defined as an aircraft with or without engine, not able to carry a human being.
10. I will not operate any turbo jet engine (axial or centrifugal flow) unless I have obtained a special waiver for such specific operations from the AMA President and Executive Director and I will abide by any restriction(s) imposed for such operation by them. (**NOTE:** This does not apply to ducted fan models using piston engines or electric motors.)
11. I will not consume alcoholic beverages prior to, nor during, participation in any model operations.

RADIO CONTROL

1. I will have completed a successful radio equipment ground range check before the first flight of a new or repaired model.
2. I will not fly my model aircraft in the presence of spectators until I become a qualified flier, unless assisted by an experienced helper.
3. I will perform my initial turn after takeoff away from the pit or spectator areas and I will not thereafter fly over pit or spectator areas, unless beyond my control.
4. I will operate my model using radio control frequencies currently allowed by the Federal Communications Commission. (Only properly licensed Amateurs are authorized to operate equipment on Amateur Band Frequencies.)
5. I will not knowingly operate an R/C system within 3 miles of a pre-existing model club flying site without a frequency sharing agreement with that club.
6. I will not fly my model aircraft in any racing competition which allows models over 20 pounds unless that competition event is AMA sanctioned. (For the purposes of this paragraph, competition is defined as any situation where a winner is determined.)



- Never fly if someone else is using your frequency (see The Transmitter section on page 2).
- Never fly during adverse weather conditions or at night.
- Always fully extend the transmitter and receiver antennas for maximum range.
- Check with your local R/C flying field to find out if there are any frequencies deemed dangerous due to interference caused by local pagers, transmission towers, etc. Do not operate on any of these channels.
- Perform a range check prior to **every** flight (see the Receiver, Switch Harness and Receiver Battery section on page 4).
- Charge the Tx and Rx batteries overnight before use (see the Before Installation section on page 3).
- Periodically cycle the Tx and Rx batteries to maximize charge capacity and run time (see the Before Installation section on page 3).
- Be certain your aircraft is balanced as noted in your model's manual.
- Never use more control surface movement than noted in your model's manual.


**TROUBLE SHOOTING GUIDE**

Problem:	Possible Cause:	Solution:
Short range	Collapsed Tx antenna	Fully extend the Tx antenna
	Interference	Check frequencies in area, check Rx installation
	Rx antenna poorly routed	Re-route Rx antenna
	Low Tx or Rx battery	Charge batteries for 15 hours prior to use
	Rx or Tx out of tune	Send radio to Hobby Services for tuning
	Severed Rx antenna	Send radio to Hobby Services for repair
	Crash damage	Send radio to Hobby Services for repair
Short run-time	Low Tx or Rx batteries	Charge batteries for 15 hours prior to use
	Batteries need to be cycled	See Before Installation on page 3
	Binding servos causing excess battery drain	Free binding components in pushrods or moving surfaces, see model's manual
	Too many servos for the Rx pack used.	Additional servos cause quicker battery drain. Use a Rx battery pack with a higher mAh rating.
Tx meter low	Tx batteries need charged	Charge Tx batteries for 15 hours
Tx meter beyond red zone but servos do not function	Rx batteries need charged	Charge Rx batteries for 15 hours
	Rx switch in off position	Turn on switch harness
	Switch harness connected incorrectly	See quick reference guide on page 4
Interference or servos glitching	Another Tx is on your channel	Do not operate your system until other system is not in use
	Outside interference (Pagers, transmission towers)	Check your local R/C club for conformation of dangerous frequencies in your area
One glitching servo	Bad servo	Send servo to Hobby Services for repair



Transmitter		Receiver	
Channels:	4-channel	Channels:	7-channel
Transmitting frequency:	72MHz band	Receiving frequency:	72MHz FM narrow-band
Modulation type:	FM, narrow-band	Current drain (w/servos):	Approximately 250mA
Current drain:	Approximately 150mA	Dimensions:	2.5" x 1.38" x 0.88"
Output power:	less than .75W	Receiving range:	500 yards ground, 1000 yards air

**SERVOS AND REPLACEMENT PARTS**

Stock #	Description	Torque	Speed	Weight	Dimensions
TOWM4500-04	SYS3000 TS-10 Micro Servo	30oz./in.	.22 sec @ 60°	0.6 oz.	1.12 x 1.06 x 0.50"
TOWM5020-23	SYS2000 TS-31Mini Servo w/Bushings	24oz./in.	.20 sec @ 60°	0.9 oz.	1.30 x 0.50 x 1.20"
TOWM4520-24	SYS3000 TS-53 Standard Servo	42oz./in.	.22 sec @ 60°	1.5 oz.	1.59 x 1.41 x 0.77"
TOWM5025-28	SYS2000 TS-63 Retract Servo w/BB	92oz./in.	.50 sec @ 60°	1.2 oz.	1.70 x 0.90 x 1.00"
TOWM5005-08	SYS2000 TS-67 Dual BB Servo	43oz./in.	.20 sec @ 60°	1.6 oz.	1.60 x 0.80 x 1.40"
TOWM4540-44	SYS3000 TS-69 Standard BB Servo	42oz./in.	.22 sec @ 60°	1.5 oz.	1.59 x 1.41 x 0.77"
TOWM4560-64	SYS3000 TS-75 1/4 Scale BB Servo	110oz./in.	.19 sec @ 60°	3.6 oz.	2.32 x 1.97 x 1.14"
TOWL70**	SYS3000 7-Channel D/C Rx 72MHz FM	To order any System 3000 servos or replacement parts, please call Tower Hobbies at 800-637-6050, or see the information below. 			
TOWM6000	SYS3000 9.6V 500mAh Tx NiCd 4FM				
TOWM6020	SYS3000 4.8V 500mAh Square Rx NiCd				
TOWM6100	SYS3000 Battery Charger TH-FBC-8B(4)				
TOWM6060	SYS3000 Switch w/charge cord Fut J				
TOWM6080	SYS3000 FM Trainer Cord				
NOTE: Each servo model available with standard Futaba J, Airtronics, or JR connectors.					

FCC STATEMENT

The receiver included with this system complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

**WARRANTY AND REPAIR****1-YEAR LIMITED WARRANTY**

*U.S.A. and Canada Only

Tower Hobbies warrants this product to be free from defects in materials and workmanship for a period of one (1) year from the date of purchase. During that period, Tower Hobbies will, at its option, repair or replace without service charge any product deemed defective due to those causes. You will be required to provide proof of purchase (invoice or receipt). This warranty does not cover damage caused by abuse, misuse, alteration or accident. If there is damage stemming from these causes within the stated warranty period, Tower Hobbies will, at its option, repair or replace it for a service charge not greater than 50% of its then current retail list price. Be sure to include your daytime telephone number in case we need to contact you about your repair. This warranty gives you specific rights. You may have other rights, which vary from state to state.

For service on your Tower Hobbies product, warranty or non-warranty, send it post paid and insured to:

HOBBY SERVICES
1610 Interstate Drive
Champaign, IL 61821

CONTACTING TOWER HOBBIES

Via Phone: Toll-Free in the US and Canada: 800-637-6050
Outside the US and Canada: 217-398-3636
Toll-Free FAX in the US and Canada: 800-637-7303
FAX Outside the US and Canada: 217-356-6608

Via The Internet: E-Mail: info@towerhobbies.com
World Wide Web: <http://www.towerhobbies.com/>

Via Mail: Tower Hobbies
PO Box 9078
Champaign IL 61826-9078