

# INSTRUCTION MANUAL

**JR**  
*feel the difference!*



# F400<sup>EX</sup>

5-CHANNEL FM RADIO SYSTEM

# 1. INTRODUCTION TO THE F400EX RADIO SYSTEM

Thank you for purchasing the JR F400EX 5-Channel Radio System. This unit has been designed to provide the modeler with a high quality, user friendly radio system that can be depended upon for years to come.

Your new F400EX system is also equipped with an extra 5th channel, which will extend the capabilities of your F400EX so that it may be used in more advanced aircraft than any other 4 channel system.

It's important that you carefully read this manual before attempting to operate your F400EX System. Please pay particular attention to Section 8, Charging Your F400EX Radio System Prior to Installation.

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## 2. SYSTEM SPECIFICATIONS

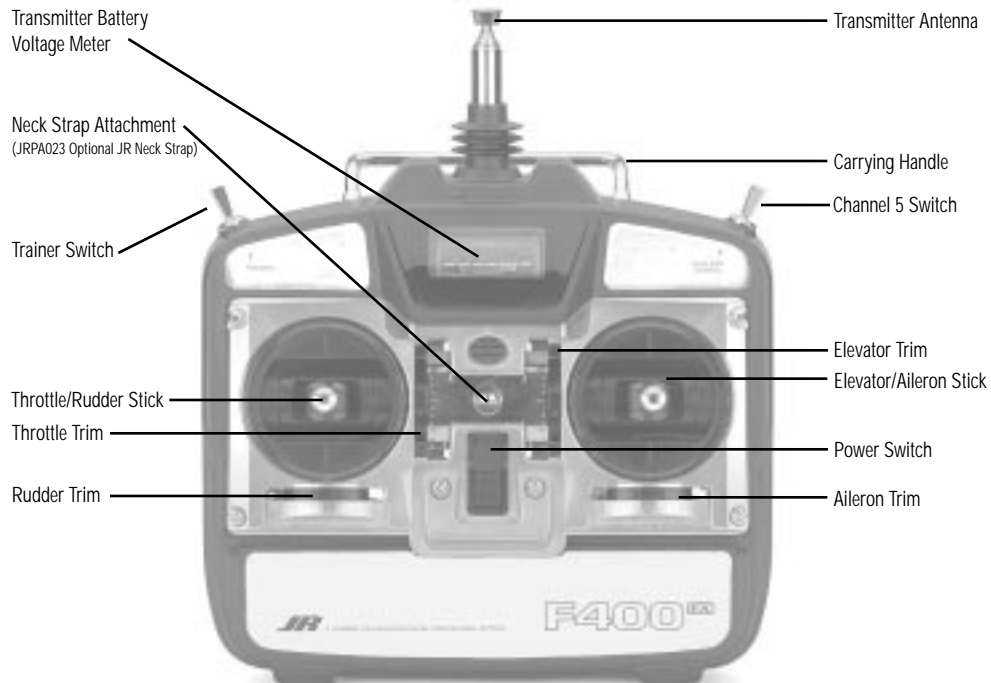
<b>System Name</b>	F400EX	<b>Servos</b>	NES-517 x (3 or 4)
<b>Transmitter Body</b>	NET-E104	<b>Accessories</b>	Mini Switch Harness
<b>Receiver</b>	NER-600		Servo Accessories
<b>Charger</b>	NEC-221		12" Aileron Extension
<b>Airborne Battery</b>	Sanyo 4.8V 600mAh		Instruction Manual
			Frequency Flags

## 3. F400EX TRANSMITTER

### 3.1 TRANSMITTER FEATURES

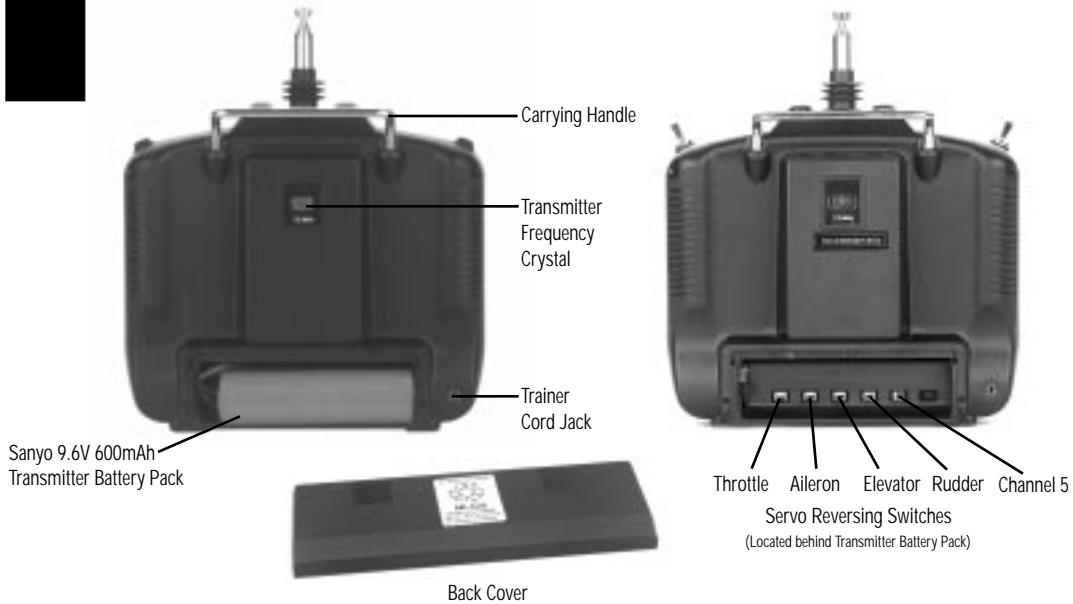
- Computer-designed, ergonomically styled case
- Servo reversing on all five channels (page 12)
- Adjustable control stick length (page 5)
- Trainer system feature compatible with all current JR radio systems
- Easy-to-read transmitter battery voltage meter
- Premium Sanyo 9.6V 600mAh transmitter battery pack
- Power output approximately 750mw

### 3.2 TRANSMITTER LAYOUT



### 3. F400EX TRANSMITTER

#### 3.2 TRANSMITTER LAYOUT — CONTINUED

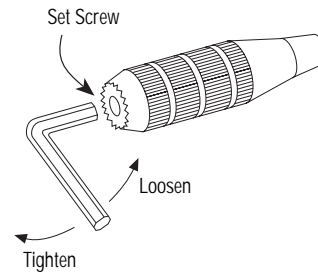


#### 3.3 TRANSMITTER SPECIFICATIONS

<b>Model Number</b>	NET-E104	<b>Output Power</b>	Approximately 750mw
<b>Encoder</b>	5-Channel Analog System	<b>Current Drain</b>	150mA
<b>RF</b>	50/53/72 MHz	<b>Power Source</b>	1.2V x 8 Sanyo Ni-Cad (9.6V 600mAh)
<b>Modulation</b>	PPM (FM)	<b>Output Pulse</b>	1.0 –2.0ms

#### 3.4 CONTROL STICK LENGTH ADJUSTMENT

To adjust the control stick length, use a 2mm Allen wrench to unlock the set screw located inside the end of the control stick. Turn the set screw counterclockwise to loosen it, then turn the knurled portion of the stick to adjust the length. Counterclockwise will lengthen the stick and clockwise will shorten it. After the control stick(s) has been adjusted to suit your flying style, tighten the set screw.



#### 3.5 NECK STRAP ATTACHMENT

There is an eye hook on the front of the transmitter for attaching an optional neck strap (JRPA023). The eye hook is precisely positioned so that the

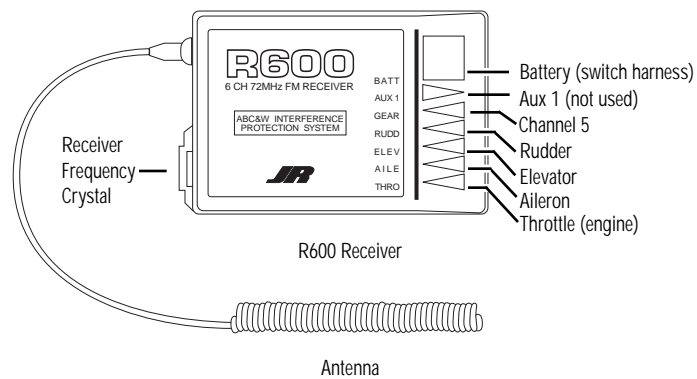
transmitter will be perfectly balanced when a neck strap is used (see Section 3.2 for location).

## 4. NER-600 RECEIVER

### 4.1 RECEIVER FEATURES

- Patented ABC&W noise rejection system for increased interference protection
- Compact, lightweight design provides easy installation into most model design
- State-of-the-art surface mount technology (SMT) design
- 6 channel capability

### 4.2 RECEIVER LAYOUT



### 4.3 RECEIVER SPECIFICATIONS

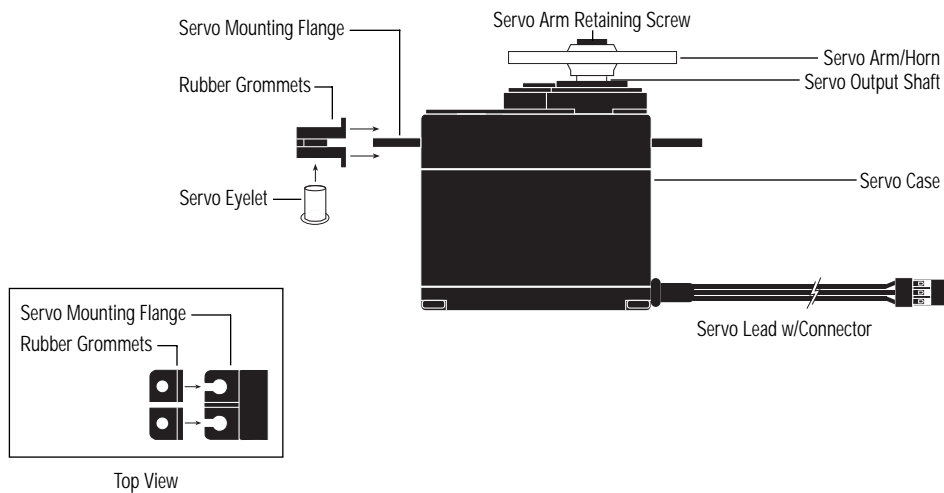
<b>Model Number</b>	NER-600	<b>Selectivity</b>	8KHz/50db
<b>Type</b>	6-Channel FM	<b>Weight (oz.)</b>	1 oz.
	ABC&W	<b>Size (W x L x H)</b>	1.43" x 2.06" x .55"
<b>Frequency</b>	50/53/72 MHz	<b>Receiver Antenna</b>	39" for all Aircraft Frequencies
<b>Sensitivity (Microseconds)</b>	5 $\mu$ s Minimum		

## 5. 517 SERVO

### 5.1 SERVO FEATURES

- A zero deadband amplifier ensures accurate neutral centering
- Low current drain
- An indirect drive feedback potentiometer gives additional protection from vibration
- State-of-the-art surface mount technology (SMT)
- The 517 features a 3-pole ferrite cored motor for reliability
- Ball bearing supported output shaft

### 5.2 SERVO LAYOUT



### 5.3 517 SERVO SPECIFICATIONS

<b>Torque (oz/in)</b>	40.3	<b>Size (WxLxH)</b>	0.73" x 1.52" x 1.32"
<b>Speed (sec./60°)</b>	.25	<b>BB</b>	Yes
<b>Weight (oz.)</b>	1.58	<b>Motor</b>	3-Pole Ferrite

## 6. AIRBORNE (RECEIVER) BATTERY PACK

<b>Model Number</b>	4N600	<b>Size (WxLxH)</b>	2.24" x .59" x 2.05"
<b>Voltage</b>	1.2V x 4 Sanyo Ni-Cad (4.8V 600mAh)	<b>Weight (oz.)</b>	3.3

## 7. CHARGER SPECIFICATIONS

<b>Model Number</b>	NEC-221	<b>Output Current</b>	50mAh Transmitter/ 50mAh Receiver
<b>Input Voltage AC</b>	100-120V	<b>Charging Time</b>	15 Hours

## 8. CHARGING YOUR F400EX RADIO SYSTEM PRIOR TO INSTALLATION

Your F400EX Radio System is shipped from the factory with both the transmitter and receiver NiCad batteries in a discharged state. Before attempting to install/operate your F400EX system, it's important that the system be charged for approximately 24 hours to ensure that both transmitter and receiver packs are at peak capacity.

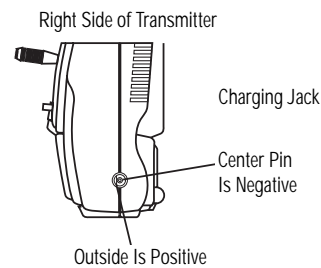
Under normal conditions, subsequent recharging of your F400EX system will require only an overnight charge (approximately 16 hours) to attain peak charge capacity.

The charger supplied with this system is designed to recharge your transmitter and receiver battery packs at a rate of 50mA.

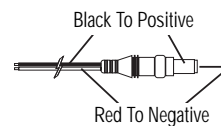
### Special note on JR transmitter charge polarity:

The center pin of the charge receptacle on all JR brand radio systems is negative polarity. Therefore, the center pin on all JR chargers is negative, not positive. Your JR radio system's charge polarity is reversed from many other manufacturers' chargers. Beware of improper polarity connections based on "color code" wire leads as they **do not apply** in this instance.

You must always be certain that the center pin on any charger used with this system is wired for negative polarity, otherwise damage will occur to the charge circuit of the F400EX. The JR warranty does not cover any system that is damaged by reverse polarity charging.



Charger Pigtail For Transmitter



Charger Pigtail For Receiver



### 8.1 BATTERY CHARGER

The pilot lamps on the battery charger should always be on during the charging operation. If they are not, check to make sure you have turned off both the transmitter and receiver.

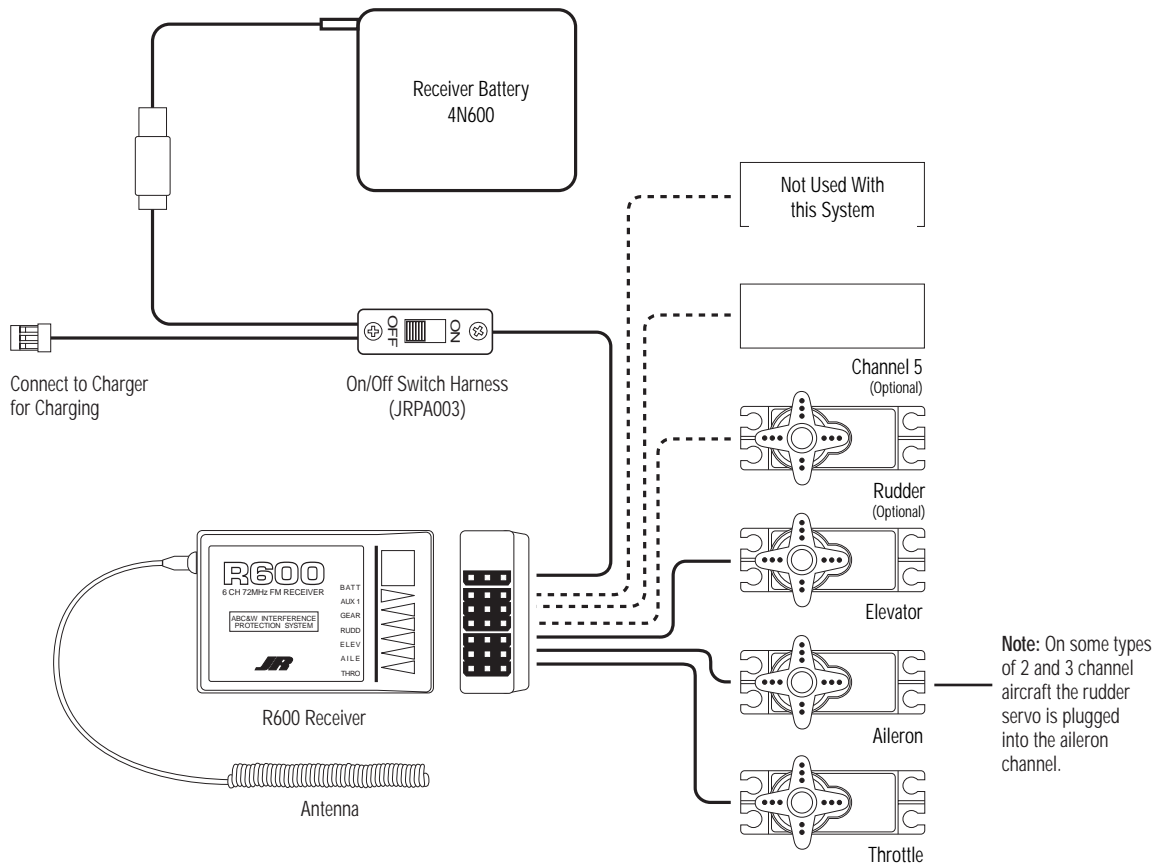
Do not use the charger for equipment other than JR. The charging plug polarity may not be the same and equipment damage may result.

Do not use other manufacturers' after-market accessories that plug into the transmitter's charging jack. If you do, any damage that results will not be covered by the warranty. To avoid possible damage, first seek expert advice if you are unsure of compatibilities with your radio. Damage during the charging operation, the charger's temperature is slightly elevated, which is normal.

## 9. PRE-INSTALLATION SYSTEM PREPARATION

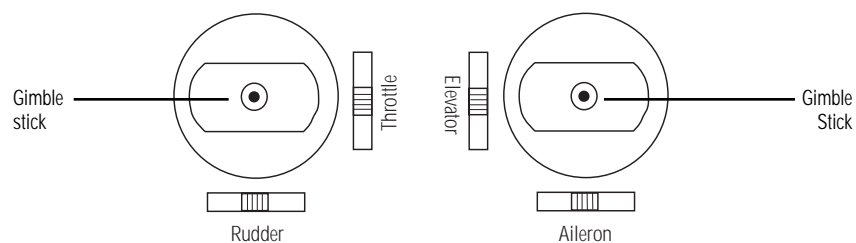
### 9.1 FLIGHT PACK CONNECTIONS

Connect all flight pack components of your F400EX system as outlined in the diagram below:



### 9.2 TRANSMITTER PREPARATION

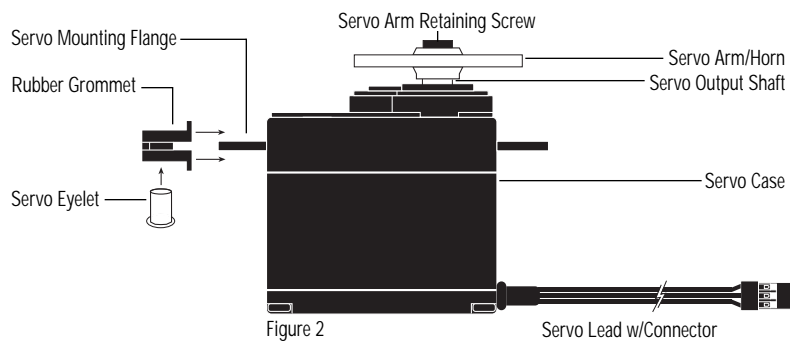
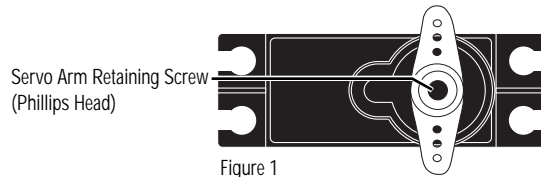
Adjust each of the four trim levers (aileron, elevator, rudder, and throttle) to the center position.



### 9.3

## 517 SERVO PREPARATION

Using a Phillips screwdriver, remove the servo arm retaining screws from each of the 517 servos as shown in Figure 1. Next, install four servo grommets and four servo eyelets to each 517 servo as shown in Figure 2.



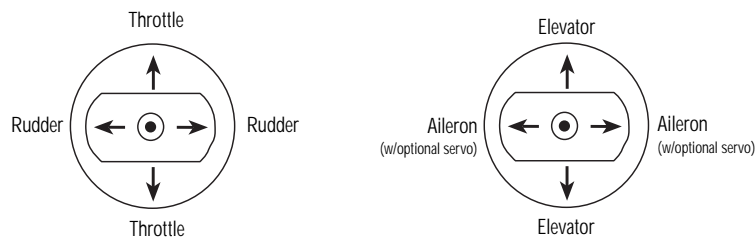
### 9.4

## SYSTEM CHECK

Slide the power on/off switch on your F400EX transmitter to the "on" position.

Next, slide the on/off switch on your flight pack switch harness to the "on" position.

By moving each of the two transmitter sticks in a fore-aft, left-right motion, the corresponding throttle, rudder, elevator, and aileron (optional) servo arm/wheel will rotate. Please refer to the transmitter stick function chart below for clarification.



With the system still activated (on), move the throttle stick to the neutral (center) position. Double check to be sure that the four transmitter trim levers are still in their neutral position.

Next, with the power still activated to the transmitter and flight pack, remove the servo arm/horn from each of the 517 servos and then turn

the power "off" to the flight pack first, then the transmitter. By doing this, the 517 servos will be left in their neutral position, and they are now ready to be installed into your model.

**NOTE:** Save the servo arms/horns; they will be reattached to the servos after installation.

## 10. FLIGHT PACK INSTALLATION

Flight pack installation varies greatly from one model to another. For your convenience, we have included the photograph below outlining a typical

flight pack installation in a standard 4-channel trainer type model airplane.



Fuselage Servo, Receiver, Battery Installation

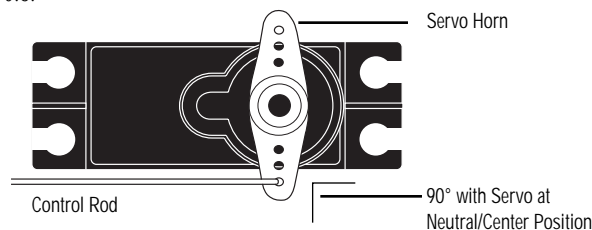


Aileron (Wing) Servo Installation

### 10.1 INSTALLATION SUGGESTIONS

It's important to correctly install the radio system in your model. Please read and carefully follow the suggestions listed below:

1. For added protection, wrap the receiver and the receiver NiCad in foam rubber that's at least 1/4" thick.
2. Run the receiver antenna through the fuselage and make sure it is fully extended. Never cut or bundle your receiver antenna — this will decrease range and performance.
3. Rubber servo grommets are included with your radio system and should be installed in the servo flanges. The servos should then be mounted on either hardwood rails or a plywood tray with the mounting screws provided. Do not overtighten the mounting screws. The flange of the brass eyelets should face down (toward the wood). See Section 9.3.
4. With the servo at neutral, install the required servo arm/horn exactly 90 degrees to the servo case as shown in the diagram below.
5. Before installing the servo output arms, make sure the servo is in its neutral position.
6. All servos must be able to move freely over the full range of their travel. Make sure the linkages do not impede servo travel. A stalled servo will drain the battery pack within a few minutes.
7. In the case of gas-powered model aircraft, mount the receiver power switch on the side of the fuselage opposite the muffler to protect the switch from exhaust residue. With other types of models, mount the switch in the most convenient place. Make sure the switch operates freely and is capable of traveling its full distance.



## 10.2 SERVO REVERSING

After radio installation, it's imperative that the proper servo/control system direction be established. Servo reversing allows you to alter the direction of the servo/control surface movement to

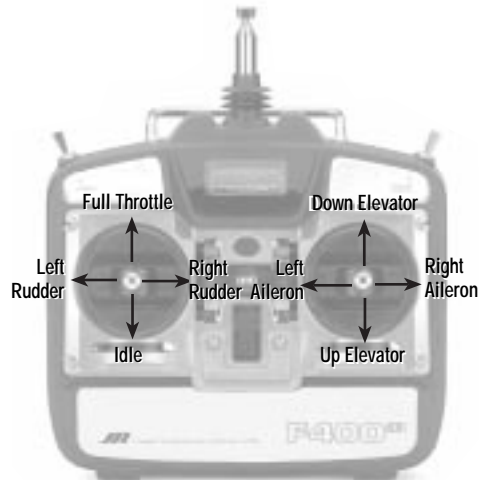
match the direction of the transmitter stick. Please refer to the chart in the section below to determine the proper control surface direction.

## 10.3 SETTING REVERSING SWITCHES

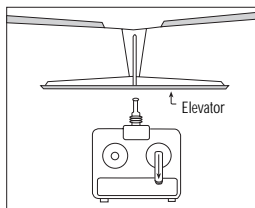
1. Connect all control linkages and check to see that all servos move freely.
2. While standing directly behind the airplane, go through the steps shown in the charts below to check proper direction of the control surface.
3. Using the servo reversing switches located behind the transmitter battery pack, adjust the direction of each servo as necessary for proper operation.



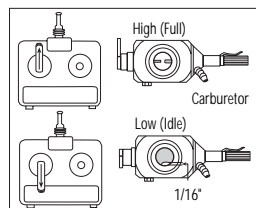
Servo Reversing Switches  
(Located behind transmitter battery pack)



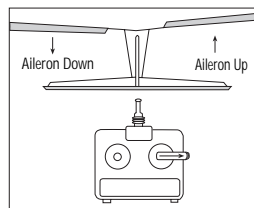
(Mode II Transmitter Shown)



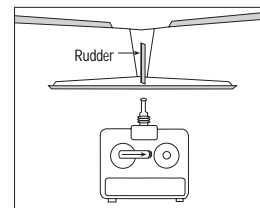
Up Elevator



Throttle



Right Aileron



Right Rudder

## 10.4 ADJUSTING CONTROL SURFACE TRAVEL

The final step in your flight pack installation will be to determine the amount each control surface will move on your model at full transmitter stick deflection. Please refer to your aircraft's instruction manual for suggested travel limits.

It's possible to increase/decrease the amount that your control surface moves at full stick deflection by mechanical adjustments.

It's imperative that the servo does not attempt to push/pull the control surface past its mechanical limits. This condition is called "binding." When a servo moves a control surface into a "binding"

position, the servo itself then becomes "stalled," meaning it's unable to reach its full deflection. This condition is both harmful to your control linkage and to your servo. This "stalled" condition will also force the servo to drain power more quickly from your flight pack battery, thereby reducing your usable flying time. Fortunately, servo "stalling" is usually easy to detect by either a "buzzing" or "humming" sound coming from the stalled servo.

The following diagram is designed to help clarify how to increase or decrease control surface travel mechanically to eliminate control surface "binding" and servo "stalling."

Figure 1 Normal (Linear) Linkage Set Up

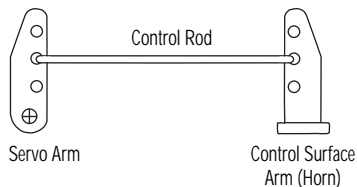


Figure 2 Increased Control Surface Movement

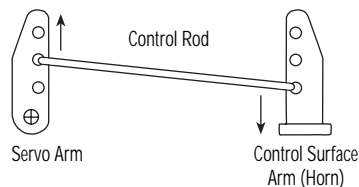
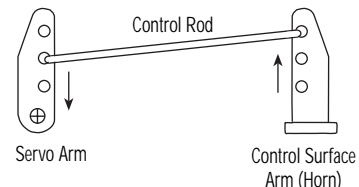


Figure 3 Reduced Control Surface Movement



To increase control surface travel, select a linkage attachment point further outward on the servo arm or further inward on the control horn closer to the control surface (Figure 2).

To reduce control surface travel, select the linkage attachment point close to the center of the servo area or further out on the control horn on the control surface (Figure 3).

Quite simply, by moving the control rod in on the servo arm/wheel, control surface travel will be

reduced, and by moving the control rod out on the servo arm, the control surface travel will be increased. The opposite holds true for the control surface arm (horn) as well. You may also use any combination of these positions to achieve proper control surface/servo travel.

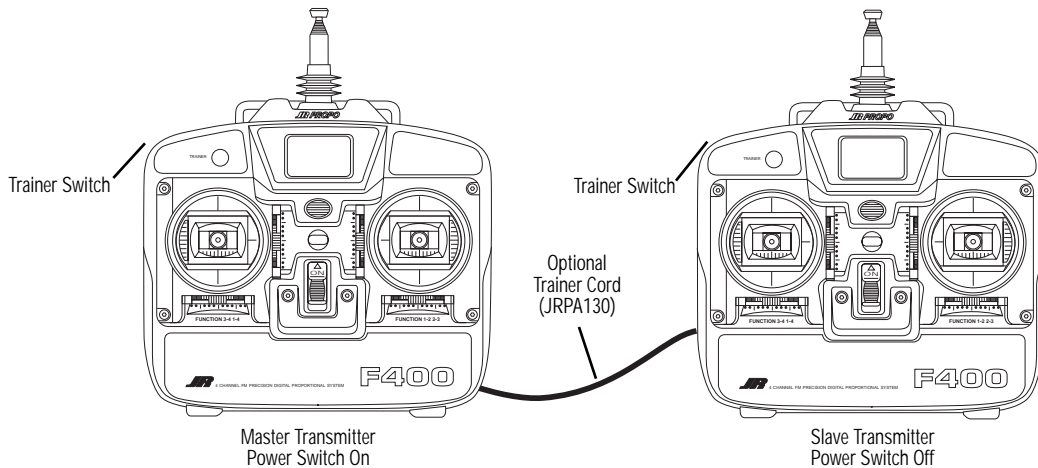
**NOTE:** Once the appropriate servo arm/wheel and control rod location has been established, be certain that you have secured the servo arm to the servo output shaft using the original servo horn screw.

## 11. PRE-FLIGHT INFORMATION

### 11.1 F400EX TRAINER SYSTEM

The F400EX features a built-in trainer system. The transmitter can be used as either a master (trainer) or as a slave (trainee). The F400EX is compatible

with all other current PPM selectable (FM) JR radios that have built-in trainer systems. An optional trainer cord is needed (JRPA130).



### 11.2 OPERATING THE TRAINER SYSTEM

1. Match the servo reversing and trims of both radios.
2. Plug the optional trainer cord into both transmitters.
3. Turn on the master transmitter.  
**NOTE:** The slave radio must be left off.
4. Test all the control functions on your aircraft with the master radio.
5. Push the trainer button on the master transmitter and check all the control functions with the slave radio.

**Special Note to Beginners:** We strongly suggest that you seek the help of an experienced model airplane pilot prior to flying your new model.

### 11.3 RANGE TESTING YOUR MODEL

We suggest that before the initial flight of your model, you first perform a ground range test to ensure that the transmitting/receiving abilities of your F400EX perform properly. Conduct the range test as follows:

Do not extend the transmitter antenna at this time. Turn your F400EX transmitter "on." Next, turn the model switch "on." Slowly walk away from the model while moving the control surfaces. The

system should function properly to a distance of approximately 60–65 feet.

**NOTE:** If your test falls short of the described range, confirm that your NiCad batteries are fully charged. If this situation remains unchanged, please contact the Horizon Service Center (address and phone number at the back of this manual) before attempting to fly your model.

## 12. USING THE F400EX EXTRA 5TH CHANNEL

Your new F400EX system is unique in that it comes equipped with an extra 5th channel, which allows the F400EX to be used in a wider variety of models than other, 4-channel systems.

### 12.1 5TH CHANNEL APPLICATIONS

Your F400EX's extra 5th channel can be utilized for a variety of useful functions. Below is a listing of some of the more popular and useful applications that will add fun and excitement to your model. Many of the items listed below are commercially available through your local hobby dealer.

**Possible Options:**

- Retractable Landing Gear
- Bomb Drops
- Flaps/Spoilers/Air Brakes
- Remote Fuel Shutoff Switch
- Special Smoke Exhaust Systems
- Glider Tow Hook Release
- Scale Navigation Lights
- Aerial Camera Photography
- On-Board Glow Systems



### 12.2 LOCATION AND OPERATION

The extra 5th channel of the F400EX is activated through the two-position switch located on the top right shoulder of the transmitter.



The 5th channel function of the F400EX, due to its activation by the two-position switch, is non-proportional in operation. In other words, when the switch is moved from its rearward to forward position, the servo will move its full travel, with no neutral position. The servo reversing function is also available for the 5th channel.

Please refer to the Servo Reversing Section of this manual, Section 10.2, for further information on this function.

## 13. GENERAL NOTES

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

Listed below are some safety Do's and Don'ts that must be followed by all pilots.

- Ensure that your batteries have been properly charged prior to initial flight.
- Keep track of the time that the system is turned on so that you will have an idea of how long you can safely operate your system.
- Perform a ground range check prior to the initial flight of the day. See the Daily Flight Checks Section below for information on how to do so.
- Check all control surfaces prior to each takeoff.
- Use frequency flags.
- Do not fly your model near spectators, parking areas, or in any other area that could result in injury to people or damage of property.
- Do not fly during adverse weather conditions. Poor visibility can cause disorientation and loss of control of your aircraft. Strong winds can cause similar problems.
- Do not fly unless your frequency is clear.  
**Warning:** Only one transmitter at a time can operate on a given frequency. If you turn on your transmitter while someone else is operating a model on your frequency, both pilots will lose control of their models. Only one person can use a given frequency at a time. It does not matter if it is AM, FM or PCM — only one frequency at a time.
- Do not point the transmitter antenna directly toward the model. The radiant pattern from the tip of the antenna is inherently low.
- Do not take chances. If at any time during flight you observe any erratic or abnormal operation, land immediately and do not resume flight until the cause of the problem has been ascertained and corrected.

## 14. DAILY FLIGHT CHECKS

1. Check the battery voltage on both the transmitter and the receiver battery packs. Don't fly below 9.0 Volts on the transmitter or below 4.7 Volts on the receiver. To do so can cause a crash of your aircraft.  
**NOTE:** When you check the receiver battery, be sure that you have polarities correct on your expanded scale voltmeter (optional).
2. Check all hardware (linkages, screws, nuts, bolts) prior to each day's flight. Be sure binding does not occur and everything is properly secured.
3. Ensure that all surfaces are moving in the proper manner.
4. Perform a ground range check before each day's flying session. The range check should be as follows:
  5. Do not extend the transmitter antenna at this time. Turn the transmitter "on."
  6. Turn the model "on."
  7. Slowly walk away from the model while moving the control surfaces. The aircraft should function properly at a distance of 60–75 feet. (If your system tests to a lesser distance, check that your batteries are fully charged and re-test. If the situation does not improve, contact the Horizon Service Center for further instructions.)
5. Ensure that all trim levers are in the proper location.
6. Check to be sure that all servo pigtails and switch harness plugs are secure in the receiver. Also, make sure that the switch harness moves completely in both directions.

## 15. WARRANTY AND SERVICE INFORMATION

### 15.1 WARRANTY COVERAGE

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

This warranty does not apply to any unit which has been improperly installed, mishandled, abused, or

damaged in a crash, or to any unit which has been repaired or altered by any unauthorized agencies. Under no circumstances will the buyer be entitled to consequential or incidental damages. This limited warranty gives you specific legal rights; you also have other rights which may vary from state to state.

As with all fine electronic equipment, do not subject your unit to extreme temperatures, humidity or moisture. Do not leave it in direct sunlight for long periods of time.

### 15.2 REPAIR SERVICE INSTRUCTIONS

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

1. Check all on/off switches to be sure they are off. This will speed the repair process of checking battery condition.
2. Return your system components only (transmitter, receiver, servos, etc.). Do not return your system installed in a model car, boat, plane, etc.
3. Use the original carton/packaging (molded foam container), or equivalent, to ship your unit. Do not use the carton itself as a shipping carton; you should package the equipment carton within a sturdy shipping container using additional packing material to safeguard against damage during transit. **Include complete name and address information inside the carton, as well as clearly writing it on the outer label/return address area.** Ship your equipment fully insured and prepaid. Horizon Service Center is not responsible for any damages incurred during shipping.
4. Include detailed information explaining your operation of the equipment and problem(s) encountered. Provide an itemized list of equipment enclosed and identify any particular

area/function which may better assist our technicians in addressing your concerns. Date your correspondence, and include your name, mailing address, and **a phone number where you can be reached during the business day.**

5. **Warranty Repairs.** To receive warranty service you must include a legible photocopy of your original dated sales receipt to verify your proof-of-purchase date. Providing that warranty conditions have been met, your radio will be repaired without charge.
6. **Normal Non-Warranty Repairs.** Should your repair cost exceed 50% of the retail purchase cost, you will be provided with an estimate advising you of your options.

Within your letter, advise us of the payment method you prefer to use. Horizon Service Center accepts VISA or MasterCard, or we can return the equipment C.O.D. cash-only. If you prefer to use a credit card, include your card number and expiration date.

Mail your system to:

**Horizon Service Center**  
4105 Fieldstone Road  
Champaign, Illinois 61821  
(217) 355-9511

## 16. PARTS LIST

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### REPLACEMENT PARTS

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<b>JRPA003</b>	Small Switch Harness
<b>JRPA100</b>	12" Gold Aileron Extension
<b>JRPA220</b>	Servo Accessory Bag
<b>JRPA225</b>	Servo Mounting Grommets
<b>JRPA226</b>	Servo Mounting Screws
<b>JRPA233</b>	Servo Mounting Eyelets
<b>JRPB3140</b>	Receiver Battery 600mAh 4.8V
<b>JRPC221</b>	Transmitter/Receiver Charger
<b>JRPR600**</b>	R600 FM Receiver
<b>JRPM400ex</b>	F400EX Instruction Manual
<b>JRPS517</b>	517 Servo Case
<b>JRPSG517</b>	517 Servo Gear Set
<b>JRPS517</b>	517 Standard Servo
<b>JRPXF**</b>	FM Crystal Set
<b>JRPA960</b>	Large JR Decal Sheet

\*\* Add channel number to stock number when ordering.

### OPTIONAL PARTS

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<b>JRPA004</b>	JR Charge Switch
<b>JRPA023</b>	JR Neck Strap
<b>JRPA101</b>	18" Gold Aileron Extension
<b>JRPA102</b>	24" Gold Aileron Extension
<b>JRPA103</b>	36" Gold Aileron Extension
<b>JRPA130</b>	Trainer Cord
<b>JRPA133</b>	Y-Harness w/Amplifier
<b>JRPA242</b>	2 x 1 Servo Tray
<b>JRPA243</b>	1 x 1 Servo Tray
<b>JRPA244</b>	Aileron Servo Tray
<b>JRPA380</b>	Transmitter/Receiver Battery Checker
<b>JRPA480</b>	Model Beacon Alarm
<b>JRPB3040</b>	Standard Receiver Battery 270mAh 4.8V Flat
<b>JRPB3240</b>	Standard Receiver Battery 1500mAh 4.8V Flat
<b>JRPS531</b>	531 Premium Sport Servo

Please refer to your JR Catalog for additional accessories.

## 17. FREQUENCY CHART

72 MHz requires no special license to operate.

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

\* It is important that you attach the enclosed frequency ID plates/flag to your F400EX transmitter antenna.

72MHz		72MHz		50MHz	
CH.NO.	FREQUENCY	CH.NO.	FREQUENCY	CH.NO.	FREQUENCY
11	72.010	36	72.510	00	50.800
12	72.030	37	72.530	01	50.820
13	72.050	38	72.550	02	50.840
14	72.070	39	72.570	03	50.860
15	72.090	40	72.590	04	50.880
16	72.110	41	72.610	05	50.900
17	72.130	42	72.630	06	50.920
18	72.150	43	72.650	07	50.940
19	72.170	44	72.670	08	50.960
20	72.190	45	72.690	09	50.980
21	72.210	46	72.710		
22	72.230	47	72.730		
23	72.250	48	72.750		
24	72.270	49	72.770		
25	72.290	50	72.790		
26	72.310	51	72.810		
27	72.330	52	72.830		
28	72.350	53	72.850		
29	72.370	54	72.870		
30	72.390	55	72.890		
31	72.410	56	72.910		
32	72.430	57	72.930		
33	72.450	58	72.950		
34	72.470	59	72.970		
35	72.490	60	72.990		

LOW FREQUENCY 53 MHz		
CH. NO.	FREQUENCY	FLAG COLOR
A1	53.100	Black/Brown
A2	53.200	Black/Red
A3	53.300	Black/Orange
A4	53.400	Black/Yellow
A5	53.500	Black/Green

HIGH FREQUENCY 53 MHz		
CH. NO.	FREQUENCY	FLAG COLOR
A6	53.600	Black/Blue
A7	53.700	Black/Purple
A8	53.800	Black/Gray



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